AN INVESTIGATION INTO THE AESTHETIC AND PSYCHOLOGICAL EFFECTS OF THE SOILING AND CLEANING OF BUILDING FACADES

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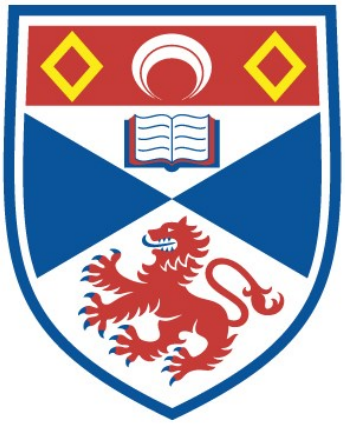
A Thesis Submitted for the Degree of PhD
at the
University of St Andrews



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An investigation into the aesthetic and psychological effects of the soiling and cleaning of building facades.

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St Andrews University 1994

Thesis submitted in fulfilment of the degree of Doctor of Philosophy.

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To those dear to me

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Note

The colour plates reproduced in this thesis are photocopies of the original photographs used in the research. The photocopying process gives reproductions of poorer quality than the originals. The colour and contrast of the photocopies are not necessarily exactly those of the original photographs used.

Abstract

As buildings age biological and non biological soiling accumulates on their facades. Soiling changes the visual appearance of buildings. This thesis investigates the aesthetic and perceptual changes which take place as a result of the accumulation of soiling. A series of experiments and surveys were conducted to investigate the effects soiling had on aesthetic and perceptual judgements of buildings. A multiple sorting procedure using photographs of buildings, revealed that both an aesthetic evaluation and soiling levels were important ways in which the buildings were conceptualised. A second study comparing photographs of architecturally similar buildings before and after stonecleaning had taken place, revealed large shifts in the evaluation of buildings following cleaning as measured by semantic differentials. Changes in evaluation were found to be dependant on the nature and outcome of the cleaning process. Buildings were also consistently perceived to be younger following cleaning. Surveys amongst residents of cities which had undergone major stonecleaning programmes revealed an awareness of this activity in line with theories of urban perception. Attitudes towards stonecleaning programmes was found to be generally favourable. A survey conducted amongst architects showed the complex range of aesthetic and perceptual effects which soiling and cleaning has on buildings. The surveys conducted amongst both the general public and architects revealed that while cleaned buildings were generally seen to be aesthetically more pleasing than heavily soiled ones, there were some situations where soiling could enhance the aesthetic appearance of buildings. A further study involving ratings of buildings which varied in terms of soiling was therefore conducted which further clarified the role of soiling in aesthetic judgements. Drawing on research in experimental and environmental aesthetics, as

well as data from the reported experiments and surveys a model is proposed which relates soiling level to facade complexity and aesthetic evaluation.

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INTRODUCTION

As we age, and show signs of that aging process, so also do our buildings. The processes of aging are as inexorable for our architecture as they are for us. Just as we might try to camouflage, or reverse the outward signs of that aging process in ourselves, so sometimes we attempt to do so for our buildings. One of the most visible features of this aging process in buildings, is the attachment of soiling to their facades. In many urban areas, particularly those with an extensive industrial past, the soiling on building facades can be very heavy, obscuring stone colour and architectural detailing.

Of all the changes to which buildings can be subjected, stonecleaning is one of the most visually dramatic. It is a process which changes not only the fundamental appearance of individual buildings, but also the environmental context in which these buildings exist. Over the last decade stonecleaning has grown into a multimillion pound industry. Much of the more recent stonecleaning activity in Scotland has taken place as part of urban renewal and regeneration programmes. Without the improvements which stonecleaning has brought about, valuable parts of the urban fabric of many older cities may well have been lost to redevelopment.

Stonecleaning work in Scotland has been funded and encouraged by Scottish Enterprise and other grant awarding bodies, partly because of the assumed aesthetic benefits which are thought to accrue from stonecleaning, and also as an attempt to economically regenerate depressed urban areas. The dramatic visual changes brought about by stonecleaning to the appearance of many northern cities, have been subject to almost no empirical investigation. The assumption from grant

awarding bodies seems to have been that buildings are always aesthetically improved by stonecleaning. No attempt has been made to investigate what the aesthetic effects of facade soiling are, or what aesthetic changes occur as a result of stonecleaning.

Although stonecleaning brings about dramatic changes in the urban environment, planning policy in relation to stonecleaning remains inconsistent in many cities. Policy has developed in the absence of research, and where planning permission has been required, authorities have tended to make decisions on an ad hoc basis. In Scotland, before any listed building can be stonecleaned, permission must be granted from Historic Scotland. In recent years Historic Scotland have become increasingly concerned about the physical and aesthetic effects of stonecleaning. In particular, questions have been raised as to whether historic buildings are aesthetically improved by cleaning, and if so at what point in a building's life cycle stonecleaning should take place. In some cases this has led to refusal of listed building consent to clean. The research reported in this thesis begins to provide a framework within which stonecleaning decision can be made.

The thesis explores some of the aesthetic and psychological issues involved in the soiling and cleaning of sandstone building facades. In particular its aims are:-

1. To establish the extent to which soiling forms part of the way in which buildings are construed.
2. To establish the perceptual and aesthetic changes which occur as a result of the cleaning of soiled building facades.

3. To investigate public attitudes towards stonecleaning in two cities which have undergone extensive stonecleaning.
4. To investigate architects attitudes towards aesthetic and ethical issues involved in stonecleaning.
5. To investigate building valuers attitudes towards the economic effects of stonecleaning.
6. To develop a theoretical model of the way in which building soiling influences both facade complexity and the aesthetic appreciation of buildings, thus providing a framework within which stonecleaning decisions can be taken.

Chapter one of the thesis explores broad conceptual issues and themes relating to environmental aesthetics. It reviews a wide range of studies which have shown the importance of aesthetic dimensions in environmental evaluations. Also discussed are the range of approaches which have been developed in relation to environmental aesthetics. Finally the approach taken in this research is identified in relation to these perspectives. Chapter two considers experimental aesthetics research. In particular the work of Berlyne is discussed, in addition to researchers who have developed and elaborated on his original work. Chapter three gives an account of the research into the collative properties of buildings identified by Berlyne and subsequent workers. Research into the roles of complexity, mystery and coherence are discussed in relation to architectural aesthetics and building soiling. Chapter four considers the issue of urban perception and cognition, and research in this area of environmental psychology is discussed in relation to the present study. Chapter five gives a brief overview of the differing philosophical approaches to the aesthetics of architecture. Also discussed is the role which climatic weathering and the natural processes of building decay play in

architectural aesthetics. This literature is discussed in relation to the concept of prototypicality and categorisation processes. Chapter six considers the mechanisms of biological and non biological soiling, and outlines the principal methods used to remove soiling from building facades. Chapter seven discusses methodological issues arising out of the data gathering techniques employed in the research.

Research findings from the multiple sorting task are reported in chapter eight, and the influence of soiling and cleaning on the conceptualisation of buildings is discussed. Chapter nine addresses the question of the perceptual changes that occurs as a result of the cleaning of building facades. Results from semantic differential evaluation of photographs of architecturally similar buildings before and after cleaning are discussed. Changes to the perceived age of buildings following cleaning are also considered. Chapter ten reports the findings of questionnaires conducted amongst a cross section of residents of Edinburgh and Glasgow. Also reported are the results of a questionnaire conducted amongst residents of a tenement street in Edinburgh which had recently undergone stonecleaning. Chapter eleven reports on semi-structured interviews conducted with property valuers on the economics of stonecleaning. Chapter twelve discusses the results of a postal survey of RIAS architects' attitudes towards aesthetic and ethical issues related to stonecleaning. More detailed consideration of issues raised in both the experimental and surveys research, in relation to the aesthetic effects of different patterns and levels of soiling, are the subject of further experimental investigation in chapter thirteen. Chapter fourteen draws together the results of both the experimental and survey results and analyses these findings in the light of the theoretical concepts discussed in the introduction to the thesis. From this

analysis a model is developed which relates building soiling to facade complexity and aesthetics, extending further these concepts within environmental aesthetics.

Chapter One

Environmental aesthetics: Issues and themes

The study of environmental aesthetics can be seen as the fusion of empirical aesthetics and environmental psychology. Empirical aesthetics has a long history in philosophy, art, mathematics and architecture. Environmental psychology, by comparison a relative new discipline, has sought to combine the study of aesthetics with human responses to the physical environment. The result has been to broaden the study of aesthetics to include human responses to a wide range of environmental influences. There can be little doubt that the aesthetic quality of both the built and natural environment is an important issue. The frequent public resistance to many proposed changes in the urban environment, or developments in the rural landscape, are testament to this. Such is the concern for the quality of the environment that environmental impact assessments, which contain measurements of aesthetic impact, often precede developments in both urban and rural environments.

An increasing number of studies (Canter, 1969; Lowenthal and Riel, 1972; Harrison and Sarre, 1975; Oostendorp and Berlyne, 1978; Russell and Ward, 1981; Groat, 1982) which have examined subjective responses to a range of environmental settings have shown the frequency and importance of aesthetic dimensions in evaluations. Canter (1969) found that an aesthetic response (pleasingness) was the main factor to emerge from both architects and non architects in their response to simulated environments. Similarly Lowenthal and Riel (1972) working within the framework of personal construct theory (Kelly 1955) found the constructs of beautiful-ugly and pleasant-unpleasant accounted for much of the variance of responses to environmental settings. Similar results were found by Harrison and

Sarre (1975). Groat (1982) using a multiple sorting procedure found 36% of constructs used by architects to sort photographs of modern and post-modern buildings were concerned with aesthetic qualities of the buildings.

The quality of the built environment is not only of value in itself but research evidence points to its influence on human behaviour and well being. Ulrich (1984) found that the quality of the view from a hospital window influenced patients' recovery time. Newman (1972) cites design issues in architecture as having an influence on urban crime.

Architecture and other aspects of environment design, perhaps because of their public nature, tend to be subject to appraisal from those outside the design professions. Research suggests that perceptions of environmental aesthetics differ between architects, other design professionals, and the lay public (Groat, 1982; Kunawong, 1986). Groat (1982) found architects and non architects differed in the constructs they used when asked to categorise buildings in a sorting task. Earlier work by Canter (1969) found similar intergroup differences. The extent of exposure to particular environments has also been shown to influence aesthetic response. Taylor and Taylor (1973) showed that young workers, and workers having shorter exposure to the work environment were more sensitive to aesthetic features of the work place. Gifford (1976) also found that familiarity influenced aesthetic responses to buildings. In addition other factors such as weather conditions, educational level, age, sex, mood of subjects and time of day influence aesthetic judgments. Recent controversies, such as the extension to the national gallery in London point to the sharp differences, not only between professionals and non-professionals, but amongst designers themselves on what constitutes aesthetic

architecture. Wilson and Canter (1990) have shown how the concept of architectural style changes during the course of architectural training. Nasar (1988) points out that although some designers disdain public values, many professionals want to produce user-sensitive design.

Porteus (1982) has reviewed approaches to environmental aesthetics using the twin criteria of methodological rigour and social relevance, and has argued for the need for each. Relevance is seen as essential in view of the widely held belief that landscape quality is declining as a result of increasing urbanisation. Scientific rigour and theory building is required in order to provide planners with a conceptual framework within which to work. With these two parameters Porteus defines and describes four major approaches to environmental aesthetics:- humanist, activists, experimentalists and planners.

The humanist approach stresses the importance of personal values, intuition and human experience in the environment. The work of Tuan (1977) and Lowenthal (1975) are examples of this approach, with their emphasis on the past as an influence on environmental aesthetics. The desire to retain old buildings, or leave the historical connections of the past in the form of some measure of soiling on building facades, can be seen as examples of this humanistic approach.

Activists are seen to encompass groups of both professionals and non professionals, who are concerned with issues of conservation, preservation and rehabilitation of the built and natural environment. Their aim is to mitigate the actions of others which they feel are detrimental to environmental aesthetics. It may well be that different activists hold conflicting views as to what, in a given situation, is

aesthetically advantageous. This can be seen in the field of stonecleaning where, for example, The Architectural Heritage Society of Scotland have consistently refused consent to the cleaning of any historic buildings which are referred to them by planning authorities. While at the same time owners of buildings in areas where stonecleaning is not permitted have, none the less, gone ahead with stonecleaning work (e.g. in areas of Edinburgh New Town).

The experimentalists, a group largely composed of social scientists, attempt to identify and understand those processes which are responsible for producing the affect in the environmental observer. The goal of this research is often to develop concepts useful to the environmental decision maker. Porteus (1982) argues that one of the main contributions of this approach is the operationalization of aesthetic concepts through constructs such as satisfaction and preference. This research has tended to try and clarify the main constituents of the aesthetic response of non-experts. This has usually involved assessments of simulations of real environments in the form of photographs or models for example. Although this research has generated much empirical data, relatively few theory based developments have been forthcoming. Notable exceptions to this pattern have been Kaplan's (1976) research on landscape preference and Wohlwill's (1976) extension of Berlyne's work on aesthetics (Porteus, 1982). To some extent, the experimentalists' work can be seen as the validatory testing of the activists' claims. The approach adopted in the research reported in this thesis is perhaps closest to that of the experimentalist.

A further approach to environmental aesthetics is that of the planner and environmental manager, whose concerns are not only for the development of theory, but its applicability in real world settings. Perhaps the best known exponent of this

approach has been Lynch's (1960) work on the image of the city, also notable is Cullen's (1961) townscape work. The work of these researchers is discussed in more detail later, suffice to say here that the broad aim of this approach has been to highlight the need for urban design to be based on the experiences of city dwellers, as they move through the urban landscape.

Porteus (1982) argues for a synthesis of approaches to environmental aesthetics, pointing out the usefulness of these links. The experimentalist for example is able to empirically verify the assumptions of the humanist. Examples of this synthesis can be seen in the research into the value of environmental complexity, or the therapeutic value of natural landscapes. Other links between the various approaches to environmental aesthetics are perhaps less well developed (e.g. the applicability of some experimental research to the policy maker or planner). It is perhaps through an integrated approach to environmental aesthetic that significant progress will be made.

The research reported in this thesis has elements of all four of these approaches to environmental aesthetic. The stonecleaning of buildings is seen by many as intuitively good. Dirt on any physical object is invariably seen as negative, something to be removed in order to restore the object to its former self. Advertisements suggest that dirt is unpleasant and unhygienic, and that things perceived as clean are good and to be preferred. So strong is this negative association with dirt that it has not been possible to find a word which describes the attachment of foreign particles to building facades which does not have some negative connotations. The term soiling has been used in this thesis as it perhaps conveys the least negative implications of possible words which could be used.

The general assumption that stonecleaning is always beneficial has led to the widespread cleaning of many buildings not only in this country but throughout the world. The cleaning of stone facades has a dramatic effect, not only on the appearance of buildings themselves, but also on the streetscape and neighbourhood. The visual and psychological effect produced are dependent on a number of factors associated with the cleaning process. In many cases the cleaning of buildings takes place in the absence of any overall urban planning policy in relation to stonecleaning. This lack of planning controls also has aesthetic implications. In some cases cleaning is supported by grants from local authorities or government agencies. In effect stonecleaning is perceived by many to be advantageous and this assumption has resulted in private and public building owners having their properties stonecleaned.

The widespread perception that stonecleaning can only be beneficial, has been challenged in recent years both by professional groups concerned with the built environment and, to a lesser extent, the general public. Concerns centre around a number of issues. The various processes of cleaning may have detrimental effects on the fabric of the stone. This is largely a question which has been addressed by the physical scientist, carrying out experimental research on the effects which different cleaning methods have on stone. Concerns are also expressed about the visual effects produced by cleaning. Stonecleaning has aesthetic implications which are not fully understood. Not only does stonecleaning in general have aesthetic implications, but different cleaning methods produce aesthetically different results. There is also the perception amongst some that building soiling not only has a visual effect, but also carries meaning in terms of character and

history, and that this might be lost if buildings are cleaned. The cleaning of single buildings cannot be seen in isolation as this has aesthetic effect on adjacent buildings in the street, and ultimately on the perception of whole urban areas. The result of these various concerns has led planners and environmental agencies to question their approach to stonecleaning and look to empirical research for policy guidance. In short the intuitive assumption that stonecleaning is always beneficial needs empirical and theoretical clarification so that environmental policy can be formulated, incorporated into planning policy, to ultimately aesthetically benefit the environment. This thesis is a contribution to that goal.

Chapter Two

Experimental aesthetics

The single most influential contributor to the development of psychological aesthetics as an empirically and theoretically grounded field of investigation has undoubtedly been Berlyne (1960, 1972, 1974) and his collaborators (Altman and Wohlwill, 1976). Many of the themes currently under investigation in environmental aesthetics (e.g. the roles of complexity and novelty in the aesthetics of urban landscapes) can be traced to concepts originally developed in empirical work by Berlyne. Opinions as to the value of this research to the study of environmental aesthetics vary. Canter (1977) argues that the stimulus material used:-

> "..almost by definition eschews any attempt to deal with the relevance of the environment presented or to expose its implications for the respondent."

Altman and Wohlwill (1976), reviewing Berlyne's work see its stress on clearly defined stimulus parameters making it particularly suited to application in environmental psychology. Clearly much of the current research in environmental aesthetics owes a debt to Berlyne's pioneering work. Berlyne's work has theoretical implications for issues to be developed later in relation to the aesthetics of stonecleaning .

Berlyne's (1960, 1972, 1974) extensive account of research into experimental aesthetics led to the concept of the "collative" property of stimuli, these attributes elicit either implicit or explicit comparative responses. Collative properties of

stimulus patterns include 'structural' or 'formal' properties, such as variations along the dimensions of familiar - novel, expected - surprised, ambiguous - clear and simple - complex.

In environmental aesthetics a number of Berlyne's collative properties have come to be extensively investigated, particularly those of complexity, novelty, incongruity and ambiguity. These various attributes relate to the degree of uncertainty contained within the stimulus material, which in turn influence the conflict produced in the individual in attempting to interpret it. This conflict leads to investigatory or exploratory behaviour designed to reduce uncertainty and conflict. Much of Berlyne's experimental work has been concerned with demonstrating that the tendency of subjects to engage in voluntary explorations of a stimulus is proportional to the amount of conflict or uncertainty it engenders (Wohlwill, 1976). Investigatory or exploratory behaviour is greatest for those stimuli rich in the collative properties of complexity, novelty, incongruity and surprisingness. Wohlwill (1976) points out that these concepts, while relating to the general nature of exploratory behaviour in relation to variations in stimulus material, do not in themselves offer an explanation of the experience of aesthetic quality. Berlyne himself in recognising this, developed the concepts of specific and diverse explorations, in order to move to a more complete exposition of aesthetic experience.

Diversive explorations are search activities engaged in by individuals which result in a level of stimulation which maintains the person in an appropriate state of arousal. Work by Berlyne (1974) has shown that this state of arousal is typically achieved by intermediate levels of uncertainty in the stimuli. In this situation activity is directed at increasing the level of arousal. In specific

explorations, the individual is presented with stimuli which generate conflict or uncertainty, and which activity is directed at reducing. Here in effect the individual is attempting to reduce arousal levels. The amount of effort expended in reducing the arousal level is a monotonic function of stimulus uncertainty, which in turn relates to its collative properties.

Much of Berlyne's investigations of diversive explorations involved the use of the exploratory choice method. In these experiments subjects are typically presented with pairs of stimuli (usually visual or auditory material), one of which they chose to be presented with again. Berlyne (1974) found that in situations where subjects were presented with a brief initial exposure to the stimuli they subsequently choose the stimuli which was more complex, irregular etc. This choice was reversed when the initial exposure was longer. These experiments appear to demonstrate that, at least in experimental situations, once curiosity regarding a stimulus has been satisfied the individual prefers stimulus of lesser complexity or more regularity. The forced choice method of investigation can be questioned as to how well it represents a direct expression of aesthetic value. However Berlyne's use of other methods, particularly those involving semantic differentials have tended to support his initial findings that optimum levels of arousal are achieved by intermedial levels of collative attributes (complexity, diversity, etc).

The relationship between aesthetic preference and arousal potential can, according to Berlyne (1974), be described by the curve in figure 2.1. This curve has a long history in psychology and was first used by Wundt (1874), although its history can be traced much further back in philosophy. Berlyne adopts the expression 'hedonic value' to embrace a number of variables which have been associated with

experimental aesthetic research and which he believes contribute to, or are indications of, aesthetic experience. The curve shows the effect of increasing arousal potential on hedonic value. As arousal potential increases above the absolute threshold the stimulus becomes more and more pleasing, with positive hedonic value reaching a peak when arousal level is at a moderately high point. Further increases in arousal potential cause a decline in positive hedonic value towards indifference (represented by the base line). Further increases in arousal potential becoming increasingly unpleasant. Research by Berlyne (1974) and Crozier (1972) suggests that, at least with the stimulus material they investigated, optimum levels of hedonic value do correspond to some intermediary level of complexity or diversity.

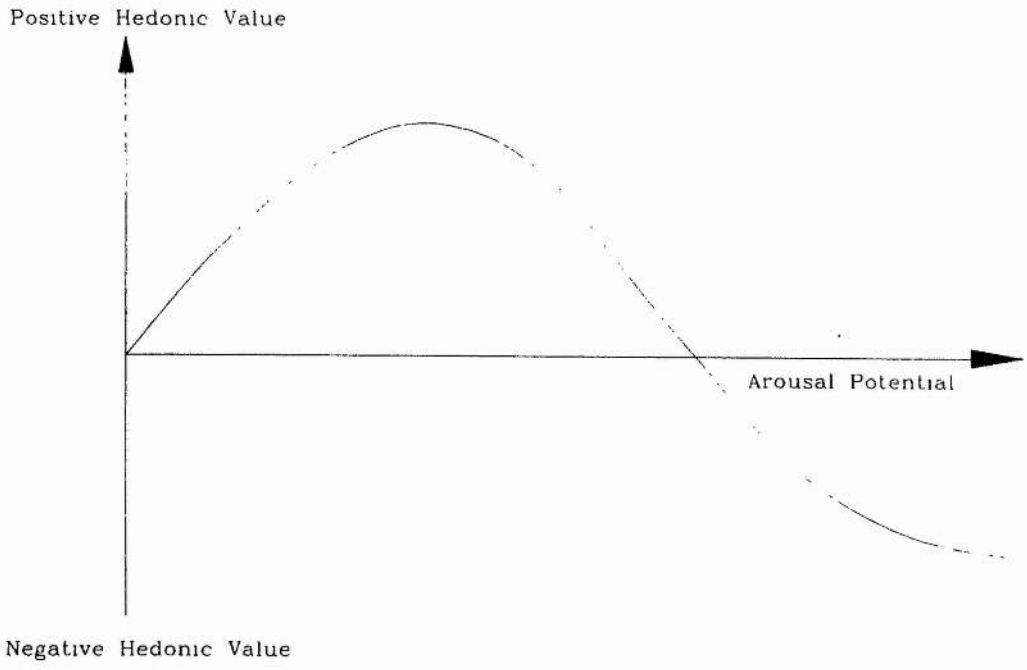


Figure 2.1 The Wundt curve

It is Berlyne's (1974) view that the aesthetic appreciation of stimuli involves a combination of two factors acting in concert. The first of these involves an arousal reducing mechanism activated largely by stimuli which are relatively high in stimulus uncertainty. The second and related mechanism is one which results in an arousal increase, activated by stimuli that are intermediary in uncertainty.

A series of experiments by Martindale, Moore and Borkum (1990) however did not support the predictions of Berlyne's psychobiological theory. The relative importance of collative variables has also been brought into question. Martindale *et al.* (1990) point out that in some situations collative variables account for only a small part of the variance for preference.

Wohlwill (1976) argues that Berlyne's simplistic two factor formulation of aesthetic preference fails to do justice to the complexity of aesthetic judgments, not least because of its stress on structural properties of the stimulus to the exclusion of stimulus content. For example Berlyne's account fails to take into consideration questions of meaning or association which are formed to specific stimuli. These features of the stimulus material, while of relatively little importance for the type of abstract stimuli used in Berlyne's and others experimental work, are none the less crucial for any explanation of environmental aesthetics. Analysis of real world environments from an exclusively structural perspective will fail to do justice to the complexity of environmental aesthetics. However, Berlyne's theory does at least give some indication of the aspects of environmental stimuli which need to be studied when considering their aesthetic appeal. It is interesting to note how many of the variables (e.g. complexity, ambiguity, surprisingness) first considered by

Berlyne in his early experimental work have been taken up and researched by later investigators in environmental aesthetics.

Chapter Three

Environmental aesthetics

While much of Berlyne's experimental work has only indirect applicability to the study of environmental aesthetics, it has none the less provided the foundation for much of the subsequent work in the field. In particular the role of collative variables in environmental aesthetics has been the focus of much of the recent research in this area. The soiling and cleaning of building facades have important influences on the collative properties of buildings, particularly in relation to their complexity, coherence and legibility.

The role of complexity has perhaps been the most widely investigated of the collative variables (Findlay and Field, 1982; Rapoport and Kantor, 1967; Rapoport and Hawkes, 1970; Kaplan, Kaplan and Wendt, 1972). Defining exactly what constitutes complexity in a scene has been one of the difficulties for this research. Kaplan and Kaplan (1982) point out that the concept is based on a number of different countable aspects. They prefer to see complexity as the visual 'richness' or diversity of a scene, pointing out that 'coherence' needs to be carefully maintained within this richness if aesthetic preference is to be enhanced. Kaplan and Kaplan (1982) point out that it is all too easy to have complexity at the expense of coherence. Wohlwill (1976) refers to one aspect of complexity as the degree of diversity. If the definition is difficult, precise measurement of its attributes is even more complex.

One methodology which attempts to objectively measure facade complexity is the type-token ratio (TTR). This method has been applied to the measurement of

intrinsic variability on building facades. The method involves abstracting from real facades the elements (windows, doors, panels, etc.) and listing these as classes (types) to which a token or code is given. By doing this facades can be 'mapped' out and some measure of the degree of complexity of the facade calculated. The TTR method was used by Krampen (1974) to analyse and compare building facades built before 1900 with those constructed after 1945. Results showed that the older facades studied were more varied than their more modern counterparts. Despite its initial promise the TTR has not been extensively employed in environmental aesthetic research.

Several studies have attempted to investigate the role of complexity within environmental settings. Schwarz and Werbik (1971), using scale models of street scenes, varied the angle of view and distance from the street in a simulation task. Using semantic differentials derived from Osgood *et al.* (1957) evaluative and activity factors, Schwarz and Werbik found complexity to be related to both dimensions. Wohlwill (1976) used slides of a wide range of environmental settings scaled on the dimensions of diversity (colour, texture, direction of dominant lines and shape of dominant elements in the field) to investigate preference scores. Wohlwill found evidence for the inverted U shaped function as predicted by Berlyne's theory. However, Breuer and Lindauer (1976) using pairs of outline drawings of buildings, in general found a linear rather than curvilinear relationship between the four measures of complexity, preference, pleasingness and interestingness. Schellekens (1978) used semantic differentials to investigate the physical factors which contribute to the aesthetic appraisal of streets. Results showed that variety in the buildings combined with the presence of trees provided optimum levels of arousal in observers. Herzog (1989) studied preferences for slides

of urban environments containing prominent natural elements. regression analysis revealed three independent positive predictors of preference; coherence, mystery and nature. One difficulty for this type of research is that while it might be possible to obtain some objective measure of scene complexity, the content of the scenes may vary considerably. For example Wohlwill's study employed both urban and wilderness scenes as stimulus material. Kaplan, Kaplan and Wendt (1972) suggest that it is this difference which is a more important variable in terms of preference ratings. In the Kaplan, Kaplan and Wendt (1972) study subjects showed a clear preference for natural environments. When measures of subjective ratings of complexity were correlated with those for preference, a linear function was obtained rather than the inverted U shaped function as predicted by Berlyne's theory. It may be, as Wohlwill (1968) points out, that the decrease phase of the curve was not present because the range of complexity sampled was insufficient to show it. Subsequent research by Wohlwill (1976) has shown that the predicted inverted U shaped function in relation to aesthetic preference and complexity does exist at least where scenes of man made environments are used.

However, a number of other studies (Canter, 1969; Kuller, 1972) have failed to show any relationship between complexity and aesthetic pleasingness. Methodological and analytical reasons may in part account for this. Given the difficulty of defining complexity and the fact that it may well be a function of a number of different variables, studies in this field that rely on subjective evaluations of 'complexity' may not be using a consistent and reliable measure. In addition, if an inverted U shaped relationship does exist, correlational measures will be low as they detect linear relationships. The concept of complexity needs to be considered in relation to other environmental variables. Kaplan and Kaplan

(1982) point out that complexity and coherence need to be considered together. Rapoport and Hawkes (1970) suggest the need to consider the social and cultural milieu in which the perception occurs. Wohlwill (1974) points out individual differences may well play a part in preference for environmental complexity.

Rapoport and Hawkes (1970) see complexity in terms of the rate of usable information. This is defined as the information that is received and processed by a person at any given time. Information theory has a long history in psychology dating back to Shannon and Weaver (1949), and Moles (1958). Essentially the theory suggests that any perceptual event constitutes potential information. If this information is predictable this leads to redundancy in the message. Undesirable signals in the transmission constitutes noise. Rapoport and Hawkes (1970) extend this model of complexity to the perception of the urban environment arguing that complexity could be measured in terms of the amount of information in the urban scene and the degree to which expectations in the environment are violated.

Birkhoff (1950) has developed a theory of analytic aesthetics which has a bearing on informational aesthetics. In this theory Birkhoff speculates that the perception and comprehension of an aesthetic object requires a sensory effort on the part of the observer. This effort is proportional to the complexity of the object. The more complex the object the more effort is needed to comprehend it. As a measure of an object's complexity (C) the theory postulates a number of elements to be perceived. Thus C varies with the number of signs to be perceived. Birkhoff also suggests that the intensity of the feeling of pleasure is also a measurable quantity. Different objects would be characterised by different aesthetic measurements (M), this varying directly with the feeling of pleasure in the observer. A third variable,

order (O), is proposed by Birkhoff as a measure of the change from effort to a feeling of pleasure. The type of order that makes up different objects will vary between objects. Birkhoff argues that aesthetic experience can be summarised in the formula:-

$$M = O / C$$

From this formula it is apparent that for a given level of complexity, (M) increases as order (O) increases. Krampen (1979) has reinterpreted this formula in conjunction with Shannon's (1949) formula from information theory and suggests that it might be possible to develop aesthetic indices of objects if it were possible to measure the variables involved. Little attempt has been made to do this in relation to environmental aesthetics.

Kaplan (1987) has developed a model of the way in which preference for outdoor scenes might be evaluated. The model involves three variables, namely complexity, mystery and coherence, as well as two effectively important informational outcomes. These outcomes are understanding and exploration. Understanding is defined as the ability to comprehend or make sense of a scene, and exploration is the extent to which the setting attracts or pulls the observer towards sources of additional information. Coherence assists the ease of comprehension of a scene and thus belongs in the understanding category. As both mystery and complexity relate to information available for future processing, these fall within the exploration category. Kaplan makes a further distinction between information which is immediately available (as is the case with complexity) and that which is predicted or promised (as in the case of mystery). Kaplan claims that the

variables in this 3 X 2 matrix (complexity, mystery and coherence X understanding and exploration) apply to a large variety of environmental settings.

Related to the concept of complexity, is that of mystery. Like complexity the term is open to a number of different definitions and interpretations. Rapoport and Kantor (1967) drawing on Empson's (1955) terminology refer to ambiguity as "any visual nuance however slight which gives alternative reactions to the same building or urban group". As Rapoport and Kantor (1967) suggest while it may not be possible to specify in exact terms the nature or relationships between elements needed to produce optimum rates of usable information (in terms of complexity and ambiguity) there does seem to be a need for ambiguity in many human situations, not least in environmental design. If there is no ambiguity then interest quickly diminishes, as once all available information has been processed attention is redirected. Rapoport and Kantor (1967) argue that much contemporary architecture and urban design, with its emphasis on clean lines and simplified design, lacks any ambiguity as a single glance reveals all. Ambiguity within a situation also has the effect of changing the workings of perceptual processes within the observer. Arnheim (1956) points out that with ambiguous stimuli:-

> "..visual pattern ceases to determine what is seen and subjective factors in the observer become more effective"

What these subjective factors are will vary between individuals. The darkened ambiguous soiled facade may be seen by one observer as mysterious and intriguing, by another as sinister and repelling. In summary as Rapoport and Kantor (1967) suggest:

> "Ambiguity and complexity are important components of a visually good environment because they help to achieve an optimal perceptual rate which is related to richness and complexity of perceptual input."

The concepts of complexity, coherence and mystery are important in terms of the way in which buildings weather and soil. When buildings are newly constructed they may be said to have a given level of complexity. As soiling begins to attach itself to the building this changes the level of complexity by initially providing a contrast between the original stone and the soiling. In effect the perceptible information from the building has increased. Whether this additional information aids in the ability to perceive the building, or adds to visual noise may well depend on the amount and way in which the soiling is attached to the building. Stated in another way the coherence of the building varies as soiling increases. It can be hypothesised that the way in which soiling influences information rate and thus building complexity, will vary during the cycle of soiling of the building.

The concept of mystery can also be applied to buildings as they soil. If the concept of mystery is seen as the impossibility of complete perception (Hubbard and Kimball, 1917) or the promise of additional information (Kaplan 1987), then clearly as buildings soil so information in terms of architectural and masonry details are hidden. This partial removal of detailing, while reducing the amount of information available also creates a new range of possible meanings to the observer. Thus the value of any mystery on a building facade may change as a building soils. The difference between mystery created in an outdoor scene, as envisaged by Kaplan, and that created on a building facade by information obscured by soiling, is that mystery in an outdoor scene can be explored by venturing further into the landscape whereas it can only be reduced on a soiled building (if

this desirable) by cleaning. Indeed one of the negative consequences of stonecleaning may be the removal of a sense of mystery from the building.

Although complexity has been the most extensively researched of Berlyne's collative variables other properties of environmental stimuli have to a lesser extent been studied. These variables include novelty, ambiguity, surprisingness and congruity. The difficulty with many of the experimental investigations of these properties is the inadequate way in which these variables have often been defined and measured.

While it is difficult to generalise from often conflicting or inconclusive evidence, it does appear that Berlyne's collative variables do positively relate to attention and interest. The relation between these and aesthetic preference is more complex. The balance of experimental evidence would seem to suggest that aesthetic preference is broadly in line with Berlyne's prediction of an inverted-U shaped function for these variables (Wohlwill, 1976). The interactional effects of combinations of these collative variables is clearly complex, but it would seem that aesthetic preference is maximal for either intermediary levels of these variables or for combinations of stimulus parameters which have variously been described as balanced, in harmony, coherent, legible etc. (Wohlwill, 1976). From an older tradition in psychology the concept of Gestalt perhaps best describes (although doesn't analyse) the interaction between these variables. However Sanoff (1969) commenting on the general role of gestalt principles in environmental design, views these negatively because of the reduction in novelty which appears inherent in gestalt design.

The concept of gestalt is perhaps an appropriate one in relation to the role of these properties of balance, harmony, coherence, unity, fittingness, etc. and the effects of widespread stonecleaning in the urban environment. The effect which haphazard as opposed to systematic patterns of stonecleaning can have on balance, harmony, coherence etc. is considerable. In squares, circles and crescents for example, there is an architectural unity of storey height, fenestration, detailing, building material, which is clearly meant to be read as a whole. If some buildings are cleaned, this unity of architectural expression is compromised (Andrew and Crawford, 1992). While this partial cleaning may increase novelty by the increased contrast between cleaned and soiled buildings, it is clearly at the expense of the gestalt of the overall urban scene.

Chapter Four

Urban perception and cognition

Chapter three discussed the research that has been directed at understanding the effects of various collative properties of environmental stimuli, on aspects of cognition. Studies covering other areas of the perception of urban environments have also been the focus of much research in environmental psychology. These studies range from research on the perception of individual buildings to the cognition of large urban areas. It is worthy of note that many of the most insightful contributions, particularly in the broader areas of urban cognition, have been made by researcher from backgrounds other than psychology. This in part may explain the wider range of methodologies used in their investigations. Perhaps the rigourously experimental methodology, pursued by Berlyne and other early psychologists, has overly influenced some later researchers who have attempted to develop and apply his concepts and methods to real world environments. It is also interesting to note that in more recent years there seems to have been a willingness to explore a wider range of techniques and theoretical frameworks to investigate urban perception and cognition.

In attempting to understand the meaning which architecture has for individuals, a large number of studies have employed techniques which essentially involve presenting simulations of buildings to subjects (usually in the form of slides). These are then rated or sorted in some way and subject to analysis which attempts to summarise the main dimensions of variance for the ratings or sortings, (examples include Bortz, 1972; Verderber & Moore, 1977; Oostendorp & Berlyne, 1978; Groat, 1982). Bortz (1972) asked subjects to rate, using semantic differentials, photographs

of the facades of residential buildings. The study showed that three factors, stimulation (exciting-soothing), impression (agreeable-disagreeable) and structural order accounted for over 90% of the observed variance. Bortz concluded that the subjective impression of a facade and its aesthetic value, is dependent primarily on the extent to which the surface is decorated. Verderber and Moore (1977) tested hypotheses relating to building imagery, preferences for high versus popular architecture, and group differences (based on income level). Subjects used semantic differential ratings as well as free descriptions to evaluate colour photographs of unfamiliar buildings. Verderber and Moore found both between group and between building differences in evaluation. There was a general preference for high, rather than popular architecture. In a series of studies Oostendorp and Berlyne (1978) asked subjects to use semantic differentials to rate slides of buildings representing major architectural styles, results were then subjected to factor analysis. They found four principle dimensions in the perception of architecture; clarity, hedonic value, uncertainty and familiarity. In these studies Oostendorp and Berlyne also explored other less conventional methods of measuring perceptions of architecture such as looking time, which have traditionally been associated with the more experimental approaches to the study of aesthetics. One criticism of factor analytic studies are that the dimensions which are ultimately derived from the factor analysis, can only be reflective of dimensions which subjects are originally asked to rate stimulus material on. Dimensions which for individuals may be important ways of conceptualising buildings, will not be revealed unless scales relating to the dimensions are incorporated in the initial ratings.

Groat (1982) in moving away from factor analysis of rating scales used a multiple sorting task to investigate the differences between architects and accountants in the way they evaluate buildings. She found that architects tended to use a different code to non architects in their perception of modern and post-modernist buildings.

Much of the work on environmental cognition has involved the use of the semantic differential, a technique originally developed by Osgood *et al.* (1957). In an early study Sommer (1965) used a number of semantic differentials to compare architecture and psychology students concepts of a range of different architectural themes. He found differences in the way the two groups evaluated the concepts of city and town. The semantic differential technique has been extensively used in studies designed to evaluate or measure subjective responses to buildings. Krampen (1971) measured architectural and planning students responses on all three of Osgood's dimensions (evaluation, potency and activity) to a number of buildings in Toronto. Joedicke *et al.* (1975) studied responses to complex space-frame structures using semantic differentials and as a result was able to adapt these structures on the basis of responses.

At the urban level, Franke and Bortz (1972) used a large number of semantic differentials to investigate the perception of parts of Berlin by residents from different districts of the city. The study found high correlations between subjects ratings of their own district but, not surprisingly, large differences in ratings between residents of different districts. A series of studies were also conducted which involved factor analysis of semantic differentials these include Canter (1969), Collins (1969), Craik (1966),and Vielhauser (1965). On the basis of these studies, Hershberger (1972) developed a set of 20 semantic scales to measure the

meaning of architectural environments. In the only published study to focus on the effect which soiling has on the evaluation of building facades, Steffan (1988) compared subjects perception of the north-east (clean) and south-west (soiled) facade of the department of architecture at Delft University. He found significant differences in appraisal between the two facades on a series of semantic differentials.

Much of the research on subjective responses to individual buildings has been conducted using laboratory type methods. The study of cognition at the urban scale has, perhaps because of the wider range of disciplines involved, been methodologically more diverse.

An early study was that of Lee (1954) whose study of urban neighbourhoods drew on the early work of Bartlett (1932) in developing the notion of the socio-spatial schema. In a radical departure from normal experimental methods Lee gave an Ordinance Survey map with their home marked on it to residents of Cambridge and asked them to "Please draw a line round the part which you consider acts as your neighbourhood or district". From the way in which residents readily did this, and from other data Lee argues that inhabitants of an area build up and continually modify a socio-spacial schema of the area in which they live. Another influential work on urban cognition was Lynch's (1960) book 'The image of the city'. Lynch's concerns were essentially practical in nature in that he was interested in how the urban environment can be planned and designed to meet the needs of their inhabitants in terms of visual clarity and legibility. The results of his work had a considerable impact in the field of urban cognition, not only because of the ideas put forward in the book, but also in the way in which they were presented. As Canter

(1977) remarks, unlike other planners before him Lynch not only presented a radical theory of how cities were represented in the minds of their inhabitants, but he took the time to collect data in support of his theory. In developing his ideas Lynch interviewed inhabitants of three cities in America (Boston, Jersey and Los Angeles) as well as taking observational data in the field. As part of the interview process Lynch asked residents to draw a sketch map of an area of the city the resident lived in (a technique to be widely drawn upon by others in later years). By doing this Lynch was able to obtain an approximate analogy for the way in which city residents conceptualised urban areas. From these sketch maps the salient features of cities could be identified. Lynch identified five key features (or elements as he referred to them) from the interviews and sketch maps which seemed to contribute to the image of the city. These were (Lynch 1960);

1. Paths. Paths are channels along which the observer customarily, occasionally, or potentially moves. As individuals move through the city along these paths, so the city is observed and other environmental elements are arranged and related.

2. Edges. Edges are the linear elements not used or considered as paths by the observer. These edges may be barriers, more or less penetrable, which close one region off from another; or they may be seams, lines along which two regions are related and joined together.

3. Districts. Districts are the medium to large sections of the city, which are conceived of as having two dimensional extent. The observer mentally enters 'inside of' these districts which are recognised as having some common, identifying character.

4 . Nodes. Nodes are the strategic points in a city into which an observer can enter, and which are the intensive foci to and from which he is travelling. The concept of node is related to the concept of path, since paths typically converge to form nodes.

5. Landmarks. Landmarks are like nodes, points of reference within the city but in the case of landmarks these are external and the observer does not enter within them. They are usually a rather simply defined physical object, typically buildings, monuments or signs etc.

While Lynch's book 'The image of the city' gives a description of the way in which urban areas are conceptualised in essentially spatial and relational terms, its limited perspective of the range of other ways in which places are perceived has been pointed out by Canter (1977). In particular Canter points to the lack of an account of conceptualising in terms of the emotional appeal of places, or of any temporal factors. These limitations were partly addressed by Lynch (1972) with the publication of 'What time is this place?'. The central theme of this book is how external signals of time within the environment fit with internal experience. Lynch argues that the quality of the personal image of time is crucial for individual well-being, as well as for success in managing environmental change. The external physical environment plays a role in building and supporting that image of time. The book suggests that environmental design should celebrate and enlarge the present while making connections with past and future.

The issues Lynch describes in both these books and the later volume 'Managing the sense of a region' mirror quite closely themes and arguments raised in relation to the policy of stonecleaning as part of urban regeneration programmes. Lynch (1972)

makes reference to the way in which economically advanced countries retain fragments of obsolete physical environments as emotional relics of times gone by. This retention of old buildings can take a number of forms. They can simply be saved from destruction and retained in their present day soiled condition. Many architectural conservators favour this position, arguing that by doing this, the buildings authentic history is retained, adding a true historic sense to the environment, as well as giving a temporal dimension to the onlooker. This is a possibility for historic buildings which would be retained under any circumstances. However, there is more doubt over soiled buildings of lesser significance which, while having some measure of architectural or historic merit, may not be considered by urban planners sufficiently important to preserve in an unrestored condition. This situation is quite common to large areas of the urban landscape, particularly in cities which have had a prosperous past, the legacy of which has been their buildings. Keeping these buildings almost always involves repairs, restoration and often complete refurbishment. In many industrial cities refurbishment often entails giving the building a 'facelift' usually involving exterior facade cleaning. Sometimes all that remains of the original building are the outer walls, all else is demolished. It can be argued that without the wholesale redevelopment of these buildings, they would simply be knocked down anyway, leaving no trace of their existence. While in many cases accepting this argument, some conservationists suggest that in attempts to bring them into useful life by alterations and stonecleaning, this leads to a false sense of history by distorting the perceived age of these buildings . A question which then might be posed is; is it better to make an honest statement about the present, by building from new in a contemporary style, or appear to distort the past by the wholesale

changing of buildings while still presenting them as old? Lynch (1972) maintains that we should consider

> "..an environmental image that is both spatial and temporal, a time-place, just as we must design settings in which the distribution of qualities in both space and time are considered."

Returning to the broader issues of the way in which places are perceived in the minds of inhabitants, Lynch's work has been developed by other geographers and environmental psychologists (Lowenthal, 1972; Lowenthal and Reil, 1972; Canter, 1977). Lowenthal *et al.*(1972), in an interesting departure from more traditional simulation methodology, took nearly three hundred observers for half mile walks around a number of carefully selected urban locations. Using semantic differentials to evaluate features of the environment they found using cluster analysis, a general evaluative grouping which related to concepts like pleasant, likable, etc. These findings fit with other studies which have also identified a general evaluative factor when assessing places which relates to satisfaction with an environment (Canter *et al.*, 1975, Hershberger, 1972). Canter (1977) has developed a schematic model of the concept of place. This model indicates that a place is the result of relationships between actions, conceptions and physical attributes. Canter argues that for a full understanding of place we need to know; (a) what behaviour is associated with, or is anticipated will be housed in, a given locus, (b) what the physical parameters of that setting are, and (c) the descriptions, or conception, which people hold of that behaviour in that physical environment.

What seems to emerge from these studies is a growing awareness amongst psychologists and other researchers of the subtlety of the relationship between

conceptual systems and environmental settings. The search for some all embracing theory or formula which will explain this relationship is likely to be an unachievable goal. Not least because as Canter (1977) points out, while we may be able to point to some generalities about conceptual systems and how they operate, these systems are context specific. The richness of our conceptual system lies in the variety of ways in which it interacts with different places.

Chapter Five

Architectural aesthetics

The philosophical issues underlying the aesthetic of architecture have been the focus of study within both architecture and philosophy. The aesthetics of architectural styles, and the debate within both architecture and philosophy as to the nature of the relationship between the two, does have some bearing on the policy assumptions within which stonecleaning takes place. There is some opposition within philosophy to the idea of a comprehensive theory of aesthetics, based largely on the views of Emanuel Kant. He argued that it was impossible to have meaningful discussion about aesthetic value since it was an entirely private emotional experience and there was no objective way of knowing that individuals were talking about the same thing when they described their reactions to beauty. However, this view is not universally held and there have been a number of attempts to develop theories of aesthetics. It is interesting to note that the work on experimental and environmental aesthetics discussed in the previous chapters, has proceeded largely in the absence of major philosophical contributions.

Architectural aesthetics has in the past, been seen largely as a part of the aesthetics of art (Carlson, 1986). Often in philosophical categorisations architecture has been considered a lesser art (Payne, 1966), although Abercrombie (1984) argues that 'architecture is building raised to the level of fine art'. Fitch (1988) argues that our experiential relationship with architecture is of a fundamentally different order to that of viewing a work of art as architecture involves all senses.

The concepts and theories which have been used in the analysis of art aesthetics have also tended to be employed in the study of architectural aesthetics. A notable attempt to consider the subject from the perspective of both architecture and philosophy has been that of Scruton (1979). The study of the aesthetics of architecture has often concentrated on individual buildings, which are considered in the same way as works of art. This has usually involved identifying those features of the design which can be considered aesthetically pleasing, in much the same way that paint built up on canvas can be viewed as pleasing. Aldrich (1963) for example, discusses architecture and sculpture together, treating the architect as an artist. In effect the emphasis has been on single buildings of impressive scale, rather than on more commonplace architecture. This rather artificial discrimination in the architectural aesthetics literature between high and popular architecture, may well reflect the way in which architecture is actually viewed (Venturi, 1966; Venturi, Brown and Izenoir, 1972). Verderber and Moore (1977) make the distinction between high and popular architecture. High architecture are buildings which have cultural significance, are viewed as serious and possess 'high' implications. Popular architecture is seen as serving a range of everyday needs within the framework of a consumer society. High architecture being historically significant, is therefore worthy of preservation, popular architecture by comparison is adaptable and replaceable.

Approaching the aesthetics of architecture along similar lines to that adopted for works of art, has a number of potential difficulties. Carlson (1986) points out that unlike art, buildings have functions and are therefore intrinsically related to the people and cultures that use them. Buildings are also related to other buildings, both in functional and structural terms as well as being physically related to those

adjacent to them. The difficulties of the traditional approach to architectural aesthetics led Carlson (1986) to adopt what he termed an ecological approach to architectural aesthetics. This approach involves:-

> "Perceiving architecture in its broadest sense as our natural human environment, that is, perceiving our created landscapes, cityscapes, and the buildings and structures that comprise them as analogous to interlocking ecosystems, with the notion of functional fit as the key to appreciating their creation, development, and continued survival."

Thus, as the urban environment evolves and develops some kind of organic unity over time, its aesthetic appeal can be appreciated in the same way that we appreciate natural beauty. Part of the aesthetic appeal and unity which develops over time are the natural weathering and soiling processes which occur on the surface of buildings. Just as a series of trees uniformly bent by the prevailing wind on an exposed moorland might be seen as aesthetically pleasing, so a grouping of buildings, uniformly weathered and soiled over time, might also be seen in a similarly aesthetically pleasing way. As Carlson (1986) points out the aesthetically pleasing fit between elements in the natural landscape or urban environment need not be the result of intentional design, but rather of the numerous uncontrolled forces which have shaped it, such that a fit of the components occurs naturally. The weathering and soiling of buildings may well be an important component which shapes this fit. An aesthetic of architecture which concerns itself with the functional fit of buildings would have a number of consequences, not least of these would include extending the scope of architectural aesthetics to include all buildings, not only those of high architecture. As Carlson (1986) points out:-

> "The functional fit of the ecosystem gives importance to each of its components."

An approach to architectural aesthetics of this nature would also be concerned with the atmosphere and feel of places and spaces, as well as the relationship between different places. While the architectural aesthetician may be happy to develop these ideas, for the environmental psychologist these may be fairly intangible concepts, difficult to define and even harder to quantify. It is often for reasons of 'atmosphere' and 'feel' that stonecleaning work in urban areas is undertaken. It has been government policy in Scotland to financially support (through enterprise agencies) stonecleaning activity in environmentally poor areas, with the intention of aesthetically improving these areas.

Consideration of architectural aesthetics in broader ecological terms as the functional fit of places, would also involve an analysis of the functions which buildings perform, as well as the ways in which their users interact with them. Functionalism has been an important theme in twentieth-century architecture. Architects such as Frank Lloyd Wright and Louis Sullivan have articulated this position, perhaps best expressed in the slogan 'form follows function' commonly attributed to Sullivan. Functionalism has traditionally concerned itself with single buildings and the problems of their design to fit their individual function. A more ecological approach to environmental aesthetics would involve a consideration of the functional fit of individual buildings in their environmental context. This functional fit may operate at a number of levels. At one level this may mean simply that the building blends in with its immediate physical surroundings, at another it might fit to give temporal meaning to a place. Andrew (1992) gives some account of how building soiling and the consequences of stonecleaning can aid or hinder this functional fit. The interaction between people and buildings, another consequence of

this broader conception of architectural aesthetics, has of course been a central theme within environmental psychology for the last few decades.

In addition to these aspects of architectural aesthetics, a number of further aesthetic issues are worthy of consideration in terms of the aesthetics of building soiling. The first of these concerns the extent to which the natural process of building decay can be seen as pleasing. Piper (1947, reprinted 1984) addressed this issue in an interesting essay entitled 'Pleasing decay'. Piper discusses the theme that as buildings age they may, particularly if forethought has been given to the original design, develop a pleasing attractiveness which is enhanced by the aging process. Good town planning according to Piper will incorporate 'present decay, as well as possible future decay'. Decay may not only be pleasing in itself, but it also provides relief and contrast. Decay is not a fixed condition, but a growing and continuing process which eventually effects all buildings. The environmental planner might then wish to consider how aesthetically pleasing a particular decayed building is, whether to arrest or even cultivate the decay, or perhaps the degree to which it should be returned to its former condition. Piper suggests that:-

> 'a weathered building can symbolise the whole of man's relation to nature',

and further,

> 'that the natural weathering of the surface of a building is beautiful, and its loss disastrous'.

Piper goes on,

> 'now the restorers hold the exact contrary of all this; they think that any clever architect can deal off-hand successfully with the ancient work; that while all things else have changed about us since (say) the thirteenth century, art has not changed, and that our workmen can turn out work identical with that of the thirteenth century; and, lastly, that the weather-beaten surface of an ancient building is worthless, and to be got rid of wherever possible'.

Old buildings are loved for what they stand for rather than for what they look like. Piper remarks that,

> 'it is usually only after an old building has been permed, and had its eyebrows plucked, that we notice that its whole character has been changed'.

Buildings, even every surface, need to be taken on their individual merits and regarded as possibly having virtue or charm in their decayed or weathered state. The pleasure to be derived from weathered and decayed buildings is, in Piper's view, a sophisticated pleasure and one which the eye has to become accustomed.

The effects of soiling and natural weathering on architectural aesthetics has been the subject of frequent comment since Piper (1947). In almost all cases these have been entirely subjective, with little attempt to quantify views. The Stone Federation, which represents the masonry industry in Britain suggests:-

> 'Some buildings have become more attractive with age having mellowed in the process while remaining well preserved. Many others have become less pleasing to the eye due to unsightly grime and dirt deposits'.

Historic Buildings and Monuments (1987) indicate in a guidance memorandum that the need and/or desirability of cleaning always needs to be carefully considered

and suggest that many buildings are pleasantly weathered rather than dirty, and further that the effects of cleaning may be very short term, perhaps only a year or two. What constitutes unpleasant dirt and grime to one may be seen as pleasing weathering by another.

The type or category in which a building is placed may also influence the acceptability and aesthetic value of any soiling on its facade. The aesthetic response by individuals to stimuli may well be mediated by their categorisation processes. Bruner (1957) suggests that all perceptual experience is the end product of a categorisation process. This process involves placing stimuli into categories on the basis of information derived from the stimuli. That aesthetic responses may be mediated by categorisation processes has not been widely investigated. Whitfield and Slatter (1979) in one of the few studies in this area found that categorisation and prototypicality had an effect on aesthetic choice in a furniture selection task. Rosch and her associates (Rosch, 1975; Rosch & Mervis, 1975; Rosch *et al.*,1976) have developed a theory of human categorisation based on prototypes. Prototypes are best examples of a category. Non-prototypic members are arranged at some empirically determined distance from these prototypes according to their rated goodness-of-example. A study by Garling (1976), using a sample of building exteriors as stimulus material gives support to the theory that preference ratings are influenced by categorisation processes. One of a number of factors which influence prototypicality and evaluative ratings is that of familiarity. Zajonc (1968) and Zajonc & Rajecki (1969) suggest that mere increased exposure to a stimulus can increase its evaluative rating. The process of categorisation and the influence of familiarity which have been shown to be influential in some experimental aesthetic studies may well have some bearing on the perceived

aesthetic value of soiling on buildings. For example, it might be argued that in most cases a prototypical example of a category of buildings named 'house' might well be of a structure with essentially a clean facade. Houses with soiled facade are less prototypical and are aesthetically less pleasing. Conversely a prototypical example of a category of buildings known as 'castles' may well be of a weathered or soiled building. A castle which therefore display a degree of soiling or weathering is seen as more typical and aesthetically more pleasing. Indeed a clean castle, which is non-prototypical, may well be rated as aesthetically less pleasing because of its cleanliness. The effect of familiarity may also be important. It could be argued that individuals who have lived their lives in urban areas where soiled house facades are the norm (e.g. Edinburgh and Glasgow) may well regard a soiled house as more prototypical than a clean one, and this in turn may influence aesthetic judgments of soiled houses.

A final aspect of architectural aesthetics which has some bearing on the aesthetics of building soiling, are the effects which light has on the shadowing and shading of building facades. Griffin & Millet (1984) discuss the use of shading as a tool to aesthetically enhance architecture. While sunlight and shading are more usually considered in terms of the technological performance of a building these elements do influence the perception of buildings. In northern climates, where sunlight hours and intensity are less than in more southerly climates, soiling can to some extent compensate for the lack of shadows cast by sunlight. There are however important differences between shadows cast by the sun, and soiling build up on building facades. The effects of sunlight in terms of shadows on buildings can be calculated from a knowledge of the position of the sun in the sky. These shadowing effects will change during the course of the day and also according to the season of the year.

The deposition of soiling is governed by the interaction of a number of elements. The most important of these being the micro-climate around the stone (in particular the direction of the predominant wind and rain), the nature of the stone itself (porosity, and wetting and drying cycles) and the architectural features of the building (which influences water run-off). These interact in a complex way to deposit soiling on the facades of buildings. The soiling pattern produced, although not the same as shadows cast by the sun, do produce an effect similar to that of shadows. Verhoef (1988) argues that in northerly cities of Europe soiling can emphasise architectural details which for most of the year would be lacking due to the absence of sharp, well defined shadows.

Chapter Six

The soiling and cleaning of building facades

In order to more fully understand the aesthetic effects of the soiling and cleaning of building facades, it is necessary to have some knowledge of mechanisms by which soiling takes place, as well as the processes involved in stonecleaning. The soiling of building facades is a complex phenomenon which takes place at or near the surface of the stone and leads to a change in the appearance of the facade. This soiling can, for convenience, be sub-divided into two main groups:-

1. Non-biological soiling due to airborne particulate matter
2. Biological soiling due to the presence of microscopic flora.

In practice, both types of soiling are likely to be present on stone surfaces, either separately or in combination. It is well recognised that this soiling may be one source of decay of the stone surface, leading to a loss of surface material. On the other hand, the soiling may take the form of surface discolouration which, although sometimes unsightly, need not necessarily result in damage to the stone surface.

Soiling does not occur in a uniform manner across the entire surface of the building. It is the nature of the surface material and the presence of architectural features, as well as micro-climatic effects, which influence the water run-off patterns on the facade. These zones of water run-off in addition to more protected areas, e.g. under projecting ledges etc., dictate the main areas of localised soiling of facades, as well as in some cases creating localized areas of stone decay. In many instances the soiling over flat areas of facades is not uniform. Two adjacent stones, apparently similar, can exhibit marked differences in soiling intensity. It is likely that this is

influenced by the porosity of the stone, microscopic pore size distribution, capillary actions, surface tension forces, and surface texture in addition to the geology of the stone. These characteristics affect the absorption of moisture into, and evaporation from, the stone. From careful examination of the pattern of soiled on a buildings facade, it is often possible to get some understanding of the reason why the building has soiled in the way it has. In aesthetic terms this understanding is important for a number of reasons. The build up of soiling gives some indication of the likely nature and pattern of resoiling following cleaning. In addition the distribution of soiling on a building gives clues as to how the building is likely to be effected by cleaning. For example, areas subjected to frequent wetting cycles and which take longer to dry out, often appear a different colour following cleaning.

The processes involved in cleaning of the stone are designed to affect only the outer, soiled part of the stone, extending to within a few millimetres of the exposed surface. If degradation of the stone has progressed too far, then cleaning alone will be insufficient to restore the appearance of the facade. Indeed cleaning techniques themselves may well cause additional deterioration of the stone.

NON-BIOLOGICAL SOILING

The atmosphere contains many types of pollutants, both naturally occurring particles e.g. solid particles, volcanic dust and also many types of man-made pollutants such as soot, industrial chemical emissions and vehicle exhaust emissions which are important in the process of soiling. Soot particularly has been significant historically in respect to its soiling effect on building facades. It is estimated that the average yearly surface obscuration rate by soot is around 10%

and may be visible after as little as one year's exposure. Recent legislation has improved air quality, especially its optical quality, by reducing emission of incomplete combustion products. Increasing vehicle exhaust emissions, the automobile aerosol, which is soot to a large extent, continues to be important in facade soiling.

In modern urban atmospheres, oxides of sulphur (S) and nitrogen (N) are becoming more significant as agents of soiling and stone decay, particularly for those stones containing calcite (calcium carbonate, $CaCO_3$); including a number of sandstones. The sulphur dioxide (SO_2) reactions in the atmosphere and with building stone are well known. The resultant sulphuric and sulphurous acids (H_2SO_4 and H_2SO_3 resp.) transform any calcite in the stone, which is stable, into calcium sulphate (gypsum, $CaSO_4.2H_2O$) which is more soluble in water. On areas of facades subject to water run-off, gypsum does not accumulate on stone surfaces, rather it is washed off to expose fresh stone for further attack. On protected areas, such as under sills, the gypsum remains as a black crust.

In addition to atmospheric constituents and pollutants aerosols are also important in the process of soiling. There are many aerosol types present in the air, consisting of particulates and gaseous pollutants. Particulate matter includes sulphates, nitrates, ammonia (NH_3), silicates, metal cations, soot, hydrocarbons, etc. Gaseous contaminants include nitric acid (HNO_3), hydrochloric acid (HCl), sulphur trioxide (SO_3), nitrous oxides (NO_x), carbon dioxide (CO_2), hydrogen sulphide (H_2S) and ozone (O_3).

Atmospheric aerosols may be classified according to size:-

a) transient nuclei (<0.1μm) These are formed by molecular processes, i.e. by burning of fossil fuels, e.g. SO_3, CO_2, NO_x and smoke from coal and fuel oil.

b) accumulation range (0.1-2μm) These are formed mainly by coagulation of transient nuclei, e.g. sulphates, nitrates, ammonia, soot and organic matter (e.g. bacteria). Particles in this size range have the longest residence times in the atmosphere and can travel long distances.

c) coarse particles (>2μm) Particles of this size are mainly terrestrial and are generally formed by mechanical processes e.g. soil particles (aluminium-silicates), sea salt, fly ash, bacteria, fungal spores, pollen and precipitation (fog, mist and rain). These particles are transported by wind currents and, because of their mass, have only small residence times in the atmosphere and hence usually have only local effects on soiling. Coarse particles dominate in windy, dry conditions (Verhoef, 1988).

Aerosols are transported onto the facade either by wet or dry deposition. In the case of wet deposition, the aerosols are formed by polluting material becoming incorporated into rain as it forms in cloud or by wash out during precipitation. Coarse particles due to their inertia, and fine particles, due to diffusion onto the surfaces of water droplets, are more easily incorporated into this deposition phase (Verhoef, 1988).

Dry deposition is principally the result of reactive gases, such as sulphurous and nitrous oxides, being removed from the atmosphere. As with wet deposition, it is the smaller and larger particles which have the highest deposition velocities. Particles in the accumulation range have the lowest deposition velocities (Verhoef, 1988).

Soot is a major contributor to building soiling. Due to the effect of particle size on optical effects, particles in the size range 0.1μm to 1μm are more optically active than coarser particles. Investigations have shown that soot is responsible for the black colouring of the submicron fraction of aerosols. This soot is also responsible for soiling of facades. The sub-micron soot particles are deposited mainly in precipitation. However, this deposition is not thought to lead to important soiling. It is probable that the attachment of soot particles has a low efficiency under wet conditions (Verhoef, 1988). Most primary soiling is therefore the result of dry deposition of soot, wet deposition being of negligible importance.

Particulates and other pollutants also contribute to soiling. Particulates, including coal and ore dusts, NH_4NO_3 (ammonium nitrate), $(NH_4)_2SO_4$ (ammonium sulphate) and H_2SO_4 (sulphuric acid) have a low deposition velocity in comparison with the reactive gases and are not considered to make a significant contribution to secondary soiling. They have a low residence time in the atmosphere and are therefore of local significance only (Verhoef 1988). Of the other pollutants, sulphates (from the oxidation of SO_2) are commonly present in the pollution deposits on facades and H_2S may produce soiling on the stone surface by reacting with iron, for example.

Pollution is transfered to the facade of buildings in a number of ways. Principal amongst these are by the action of the wind and water. Wind flow patterns around buildings are complex, being influenced by the site topography and architectural form and features, resulting in fluctuating zones of suction and pressure and local vortices and turbulence. It has been noted that, under light wind conditions (i.e.

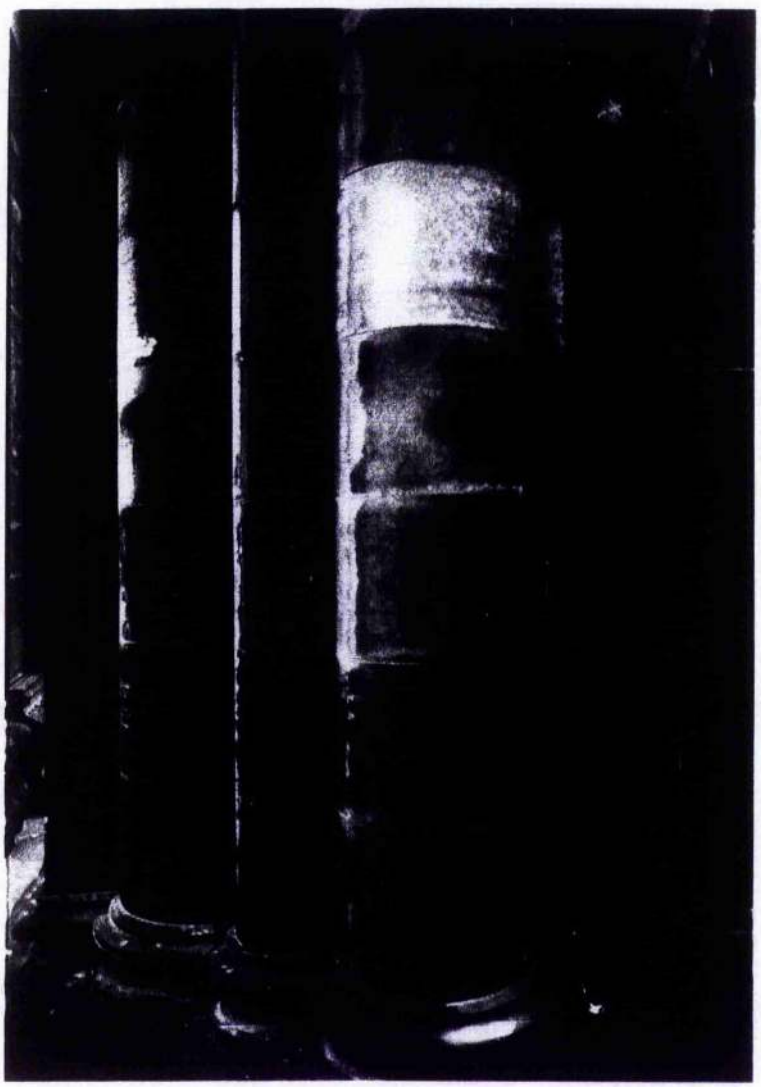
minimum turbulence), particles tend to be deposited on windward faces. In stronger wind conditions the increased negative pressures and eddies on leeward faces will tend to concentrate dirt in these locations (Verhoef, 1988). Plate 6.1 gives an example of the way in which micro climate influences soiling distribution.

Mist in the air causes coagulation of particles and hence their sedimentation. Rain and other forms of atmospheric water can capture particles and atmospheric pollutants and precipitate them. The concentration of these pollutants is increased in foggy weather, when coagulation of the particles takes place. It may therefore be surmised that the geographical location of the building and its micro-climate will exert a considerable influence on the rate of soiling and decay of the stone; in addition to the characteristics of the stone itself.

Materials deposited by dry deposition may be dissolved by atmospheric moisture, to permit sub-surface decay to proceed. Moisture is therefore the vehicle by which materials may be transported into the stone, or from the interior of the stone to the surface. In addition, since natural rain water (which also contains dissolved SO_3) is a dilute solution of carbonic acid (H_2CO_3) it may also attack the cementing materials of certain stones.

The attachment of particles to the stone surface depends to a great extent on their size and shape which, in turn, influence the nature of the forces between particles. The largest particles (>10μm diameter) are subject to gravitational forces and are deposited as a sediment. They will remain attached to the surface if adhesive forces are sufficiently large (Verhoef, 1988). In the case of smaller particles (<0.01μm diameter) molecular forces (Van der Waals forces) predominate. Such

Plate 6.1 The effect of microclimate on soiling distribution. The direction of prevailing wind and rain has influenced the pattern of soiling on this building. Soiling is heavier on leeward facing stone.



forces are exerted between two particles and between the particle and a surface. Particles can also be subjected to electrical forces which may attract particles to each other or to surfaces. Repulsive electrical forces will have the opposite effect (Verhoef, 1988).

Surface condensation on the face of the stone contributes to the soiling of the surface. Winter conditions in Scotland typically produce an ambient relative humidity in excess of 80%, and therefore promotes condensation on the stone surface. When the relative humidity exceeds 65% capillary or surface tension forces can be important in the attachment process.

The high thermal capacity of stone on external surfaces has the effect of creating a temperature gradient within the boundary layer of air in contact with the stone. The surface temperature of the stone may be significantly below that of the ambient air. As there is more molecular agitation in hot air than in cold air there is a tendency for dust to be condensed onto the colder surface (Verhoef, 1988).

Fluid movements within stone can have a number of adverse physical effects, principally the dissolution of unstable minerals, which are subsequently deposited on the stone surface. This in turn can have aesthetic consequences. Fluids may move within porous stone with considerable ease. Water gains access to the interior of the stone through exposed faces and by transfer from the surrounding stones and mortar joints. The subsequent reversal of this fluid movement as a result of changes in the atmospheric conditions (temperature and vapour pressure), draws the capillary fluids to the exposed surfaces where evaporation at or adjacent to the surface takes place. Minerals from within the stone may be taken into solution and

re-precipitated at the surface. This precipitation of dissolved minerals contributes to the formation of surface crusts or a relatively impermeable surface layer (patina).

The buildings studied in this thesis are predominantly of sandstone construction. Present on a number of the facades of these buildings are orange/brown staining caused by iron oxides and hydroxides. Fluid movement within the body of a sandstone over many years dissolves minerals and re-precipitates them on, or close to, the surface of the stone as evaporation takes place. If the minerals leached from within the stone are darkly coloured (such as those containing iron and manganese) their redeposition at the surface can cause aesthetically displeasing staining. Iron staining may also be caused by the action of stone cleaning chemicals. Staining occurs in a similar way to 'natural' iron staining by the leaching of coloured minerals within the sandstone and their re-precipitation at the surface. However, in this case large amounts of iron are mobilised over a short time scale. Note that if this mobilised iron is then removed from the stone by stone cleaning it will result in a "bleached" stone surface.

The architectural features and the fenestration of elevations of buildings and monuments have a direct influence on soiling, due principally to the rainfall run-off patterns on the facade. On most buildings the rainfall run-off is usually vertical, although local features may cause diversions to the water flow path, breaking the stream into flows with relatively fixed directions.

Rainfall mainly strikes the top part of an external wall and produces a run-off film down the wall which is a few tenths of a millimetre in thickness and has a

velocity of about 1m/s (Verhoef, 1988). Projecting elements provide shelter and, depending on the stone type, may result in a relatively clean zone below the projection or the development of black gypsum crusts in carbonate stones. Run-off from horizontal or sloping surfaces tends to produce a clean washed zone immediately below the feature followed, at a lower level, by a more heavily soiled zone. It is thought that this is due to dirt, transported from above, being redeposited on the drier surface at a lower level (Verhoef, 1988). A feature of sandstone buildings in particular is the heavily soiled zone below large glazed areas. These areas tend to be subjected to increased volumes of water run-off.

BIOLOGICAL SOILING

In addition to soiling from non biological sources, buildings can be soiled by a range of biological organisms. Biological organisms clearly have an effect on the aesthetics of a building but the precise nature of this effect has never been investigated. The way in which lichen grows on roof tiles for example provides an indication of a building's age, in adding to the texture of the roof. A recent extensive new shopping precinct in Aberdeen has recently been built complete with slate roof. It is interesting to note that, in the more visible areas, old tiles complete with biological growth have been used in preference to new slates, presumably in an attempt to age the building and help it 'blend in' with surrounding buildings. The biological growth often found on the walls of ancient buildings might also contribute to the aesthetics of these buildings.

Four types of biological organism are of importance in terms of soiling. These are:-

Algae : Algal growths are usually green when fresh, becoming black when the surface dries out. Most algae which colonise on stone belong to the class of Green algae. Colours other than green may occur, depending on the species present. Red, brown and blue-green species of algae are common. They appear as filaments or powders which are slimy if the surface is moist. They are very common on the exterior surfaces of buildings and can be found on almost any substrate which remains damp for a suitable duration. (BRE, 1972; Grant, 1982).

Fungi : These include moulds, mildews and yeasts. They are not photosynthetic and do not require light to grow but they require organic material as a food source. They may be grey, green, black or brown in colour and often take the form of furry spots or patches on the surface of the stone (BRE, 1972).

Bacteria : There are many different forms of bacteria but all are too small to be visible to the naked eye. There are both photosynthetic and non-photosynthetic types. Cyanobacteria are often the first organisms to colonise a fresh stone (Grant, 1982). Many are capable of fixing nitrogen and can therefore aid colonisation by other organisms.

Lichens : Lichens are a symbiotic intergrowth of algae and fungi. They are photosynthetic and their food requirements are for light and mineral salts. They are often grey, yellow or orange in colour. Much of the body of the lichen is under the surface of the substrate but fruiting bodies may be seen on the surface (BRE, 1972).

On building facades green algae assemblages are the predominant form of biological soiling and colonise a wide range of substrates including stone walls and mortar joints. They are often well developed on wall surfaces subjected to excessive water run-off from leaking gutters and downpipes.

There is some evidence to suggest that there are several factors which account for the differences in the time of appearance of algae on surfaces. Perhaps the most significant factor is the dampness of the surface. This will be influenced by the inclination and orientation of the surface; horizontal and sloping surfaces are likely to have a higher moisture content. The nature of the surface is also thought to be influential, with rough surfaces having large pore openings tending to encourage algal growth more than smoother surfaces with smaller pore spaces, thus encouraging the collection and retention of substrate moisture.

The architectural style as well as the nature of the building material and ambient weather conditions interact in a complex way to produce the soiling found on buildings.

The cleaning of Buildings

A number of methods are used to remove soiling from buildings. These can be broadly divided into physical and chemical methods of cleaning. The method chosen to clean buildings is dependent on a range of different factors. How a buildings is cleaned has a large influence on the aesthetic appearance of the building following the cleaning process, particularly in terms of the final colour of the stonework and the level of soiling removed from the facade.

PHYSICAL CLEANING

Physical cleaning methods work by abrading the surface layer of the sandstone, to which soiling is attached. This has two important effects on a facade, it causes erosion and surface roughening. The amount of erosion and roughening that occurs depends on the pressure used in cleaning and the nature of the stone. The state of decay of the stone also affects, to a large extent, the results of cleaning. Physical methods of cleaning are usually more controllable in terms of the amount of soiling removed.

With sandstones, if soiling has not penetrated too deeply, removal of a depth of stone equivalent to 1 to 2 grain diameters (generally about 1mm) will successfully remove most of the soiling. If soiling has penetrated more deeply, as may happen if a sandstone is particularly porous or particularly heavily soiled, then grit blasting (the commonest form of physical cleaning) until all soiling is removed, may result in an unacceptable degree of erosion and roughening of the surface.

Both wet and dry grit blasting have similar erosive effects on a facade. The use of wet blasting produces some effects which do not occur with dry blasting. Most noticeably, wet blasting leaves a residue of dust and debris adhering to the facade which should be washed away after cleaning. If debris remains adhering to the facade it will collect on ledges and other surfaces and may be washed into the surface pores of the stone. This may well accelerate the rate of resoiling of the facade as well as being detrimental to the aesthetic appearance of the building. It is also possible that the use of wet cleaning techniques could mobilise any salts

present within the stone of the facade (wet blasting will not itself introduce any salts into the sandstone since it does not involve the use of any chemicals). Any salts which are mobilised will tend to be deposited as efflorescences at or near the surface of the stone causing colour disfigurement. This problem is rarely seen with physically cleaned buildings but is quite prevalent with chemically cleaned sandstones.

Since physical cleaning does not introduce any chemicals into the stone, most of the effects of physical cleaning methods might therefore be expected to be seen immediately after cleaning as surface erosion and roughening. It is possible, however, that longer term effects could occur following abrasive cleaning. When sandstones have been in place, exposed to weathering for many years, the surface of the sandstone undergoes a number of changes in addition to soiling. Mineralogical changes may have taken place which will have produced a patina on the surface with different physical characteristics (e.g. changes in mineralogy, porosity, permeability or colour) to the main body of the sandstone. Disruption of this stable weathering layer could have potential long term effects by exposing a new surface to the weathering zone. Mobilisation of iron compounds and salts, previously stable inside the sandstone, along with changes to clays and other minerals could occur as a new stable weathered patina establishes itself over the course of the following decades. This may lead to colour changes (particularly orange/brown iron staining) at the surface of the stone.

The roughened surface of the sandstone may be more prone to biological soiling as changes in water absorption or moisture retention and the increased surface area

caused by roughening may make the stone a more hospitable surface for colonisation by organic growths.

The main physical effects of grit blasting are erosion and surface roughening. The effects can vary depending on the pressure used and the stone type. There is not usually any problems with efflorescences (salts seen on the surface of the stone) unless salts were present in the sandstone before cleaning. Colour changes may occur due to removal of the weathered patina if the newly exposed sandstone is not stable to weathering. The rate of resoiling can be accelerated by the roughened surface.

CHEMICAL CLEANING

In the case of sandstones, chemical cleaning works appears to work by dissolving some of the surface constituents of the stone to which the soiling is attached. The soiling is then removed along with some dissolved "sandstone" when the facade is washed down. The amount of stone which is dissolved in this process is very small compared to the amount of material which is abraded in physical cleaning. However, some solid material can be lost if the chemical treatment attacks and loosens cementing minerals in the sandstone. Grains can thus be lost from the sandstone surface where the cementing matrix has been removed.

Grain loss may be particularly bad where the cementing matrix is highly soluble in acids (the main constituents of chemical cleaning fluids). This is the case where the cementing mineral is calcite. If the calcite is patchily distributed this can result in pitting of the surface.

Sandstones are often highly porous and permeable and whenever chemicals are applied to sandstone, no matter how carefully the sandstone is washed down afterwards, some chemicals may inevitably be left behind in the stone. Chemicals may gain access to the interior of the stone either through penetration into the sandstone surface or through joints where pointing has deteriorated. If chemicals remain in the sandstone following cleaning this can lead to several potential problems.

If the chemical residue is soluble in water, then salts will be mobilised within the sandstone during wetting and drying cycles. This may produce efflorescences at the surface of the sandstone. Chemically cleaned sandstone buildings can display quite large areas of white efflorescences. As well as being aesthetically displeasing, efflorescences are potentially harmful to the stone. By processes of crystal growth or absorption and release of water, salts can cause microscopic damage within the stone leading, over the course of a number of years, to spalling of the surface or damage around joints.

Chemicals can be adsorbed and retained by clay minerals in a form which is not easily washed out during the wash off phase of cleaning. These adsorbed chemicals form salts when neutralised which may then be released relatively slowly from the clay minerals leading to the formation of efflorescences. Chemical residues in a sandstone may also cause changes in the near surface porosity and permeability. If this restricts the ability of a stone to evaporate absorbed moisture from its surface this may also lead to spalling of a surface crust. These effects have both physical and aesthetic implications.

Another potential effect of chemical cleaning are colour changes to the sandstone surface. Bleaching may be caused by removal of clays and other coloured minerals from the immediate surface or by selective removal of elements, such as iron, from particular minerals. Bleaching can be caused by the application of too strong a solution of hydrofluoric acid or by application of the acid for too long a period of time. This bleaching often results in stonework taking on a light grey appearance. In practise stonecleaning using chemical cleaners requires a high degree of skill if physical and aesthetic damage is not to be done to the building. Alas, in practise this skill is often absent, even where important buildings are being cleaned.

Mobilisation of previously stable, iron-rich minerals within the sandstone may cause orange and brown iron stains to develop on the sandstone surface. These are caused by moisture evaporating from the surface of the sandstone. If the fluids introduced into the sandstone during stonecleaning dissolved iron from the sandstone, the iron will be deposited at, or close to, the surface as the moisture is drawn to the surface by evaporation and capillary action. This clearly has implications for the aesthetic appearance of buildings. The danger of chemical residues left in the sandstone following cleaning may be reduced if damaged pointing is replaced prior to stonecleaning.

The main dangers from chemicals used in cleaning methods are of causing efflorescences, bleaching and iron-staining. Very little erosion or surface roughening should occur unless the sandstone contains minerals which are highly soluble in acids.

Chapter Seven

Methodological Issues

The literature reviews of the aesthetics research, as well as that conducted in the areas of urban perception and cognition, give some indication of the diverse range of methodologies which have been developed within environmental psychology. These have ranged from carefully controlled laboratory studies of abstract stimuli (Berlyne, 1960) to data gathered from observers walks around urban areas (Lowenthal, 1972). The debate within environmental psychology, as to the appropriateness and value of different types of data gathering and analysis techniques, has gone hand in hand with research. The early experimental work of Berlyne (1960) for example, borrowed heavily from the research methodologies of mainstream psychology and has been criticised (Canter, 1977) for its lack of external validity. More recent research in environmental aesthetics has tended to use real or simulated environments as the material on which the research is based. The way in which both quantitative and qualitative data is gathered from respondents has also been the focus of debate within environmental psychology. Two issues from this debate are of particular relevance to the methodology which has been adopted in this research. First is the question of the use of photography as a method of environmental simulation. Secondly, the way in which data is gathered from respondents has a number of methodological implications, of particular concern here is the use of the semantic differential technique and its alternatives. Each of these issues will be addressed in turn.

The use of simulation techniques is often required in environmental psychology research because of the difficulty and impracticality of using real environments.

This has been the case in this research. In addition, the use of certain data gathering techniques, for example the multiple sorting procedure used in this study, requires subjects to be exposed to numerous buildings simultaneously. Therefore some form of simulation is automatically necessitated. If simulations must be used the question then arises as to the validity of the simulations, i.e. to what extent are responses to simulations of environments similar to those of the real environments they are simulating? This research, along with a large number of other simulation studies carried out in environmental psychology has involved the use of photographic techniques. A number of studies have been carried out to compare reactions of people to real environments compared with photographic representations of those environments. These studies have tended to show that responses are sufficiently similar to justify the use of photographic simulations, particularly where colour photographs or slides are used (Howard *et al.*, 1972; Seaton and Collins, 1972; Hershberger and Cass, 1974; Shafer and Richards, 1976). Howard *et al.*, (1972) compared responses of subjects to real buildings, black and white, and colour transparencies. The results indicated that responses to the slides produced similar although less extreme ratings than responses to the real buildings. Howard *et al.* (1972) also noted that weather conditions prevalent at the time the photographs were taken influenced responses. Photographs taken in sunny conditions produced less negative ratings than those taken in overcast conditions. Seaton and Collins (1972) in a similar type of experiment compared responses to real environments with those of colour, and black and white photographs of those environments. Results from this study showed that responses to colour photographs correlated highly with the responses to the environments which they were representing. Hershberger and Cass (1974) compared responses to real environments with a range of different simulations of those environments. They concluded that

colour slides and photographs were the most promising media representations of real environments. Shafer and Richards (1976) compared viewers reactions to outdoor scenes with colour photographs and transparencies of those scenes, using the semantic differential technique. Results showed that, when colour slide or photographic presentations adequately depict most of the variations of natural and man made environments, semantic differential ratings using these forms of simulation agree favourably with similar measurements of the real environment.

A further methodological question which has to be addressed in relation to environmental aesthetic research is how responses to environmental stimuli can be measured. Almost all the reported research in environmental aesthetics has adopted approaches which requires some form of verbal response from subjects. This approach has been supported by those who argue that semantic scales offer the best way forward for understanding the emotional and cognitive responses which people have to environments. Hershberger (1972) argues that because of the widespread use of words in all cultures, they are probably the best means to study thoughts and feelings. Whether verbal responses from subjects adequately or accurately represent feelings and cognitions about the environment is open to question. Zajonc (1980) has argued that:-

> "Affect and cognition are under the control of separate and partially independent systems that can influence each other in a variety of ways, and that both constitute independent sources of effects in information processing."

Research by Zajonc (1980) suggests that affective judgements may be relatively independent of , and precede in time, the type of perceptual and cognitive processes commonly assumed to be the basis of these affective judgements. The extent to

which the range of both affective and cognitive responses to environmental stimuli is being measured by simple verbal responses is open to question.

Much of the investigative research in environmental aesthetics has used the semantic differential technique developed by Osgood *et al.*, (1957). In their research Osgood *et al.* (1957) identified three dimensions of semantic meaning derived from factor analysis of semantic differentials. These were an evaluative factor (scales which loaded heavily on this factor for example were good-bad, beautiful-ugly), a potency factor (which loaded heavily on scales such as hard-soft, masculine-feminine) and an activity factor (which loaded on scales such as fast-slow, active-passive). These three factors, and the semantic differential scales which load on them have been widely used in environmental psychology research, to measure responses to environmental stimuli (Canter, 1969; Bortz, 1972: Verderber and Moore, 1977; Oosetendorp and Berlyne, 1978; Flade, 1978). The three dimensions of evaluative meaning identified by Osgood *et al.*, (1957) as well as the value of the semantic differential as a technique in environmental research, has been questioned by some researchers. Canter (1969) compared architectural students with other, non architectural students using the semantic differential technique. Factor analysis of the semantic differential ratings revealed three major factors which were character, coherence and friendliness. Canter (1969) suggests these three factors relate to one evaluative dimension, rather than the dimensions of potency, evaluation and activity proposed by Osgood *et al.* (1957) . The use of semantic differential methodology is supported by those who believe it gives valuable insights into environmental meaning. Hershberger (1972) argues that the technique offers the possibility of obtaining a definitive set of semantic scales which will enable architects to be able to accurately and consistently predict

responses to buildings before they are constructed. By comparison Wohlwill (1976) states that no further insights can be expected by the proliferation of factor analysis of semantic differential ratings. Criticisms of semantic differentials mainly focus on the issue that, using personal construct theory terminology (Kelly, 1955), subjects are being provided with constructs on which to rate environmental stimuli. This leads to a number of potential difficulties for researchers. Constructs which are provided for subjects, rather than being elicited from them, may not be the ones which they would normally use i.e. they may be outside the subjects range of convenience for those constructs. A further difficulty is that supplied semantic differential scales may not be understood or interpreted in the way in which the investigator intended, or how other subjects use the same scales. This difficulty applies to many other techniques where subjects are having to respond in ways predetermined by the investigator. These criticisms of the semantic differential as a technique in environmental research, has led to the adoption of other methods which attempt to place fewer restrictions on responses elicited by subjects. Most prominent amongst these techniques has been the multiple sorting procedure. The multiple sorting procedure requires that subjects assign elements to categories of their own devising. No limitations are placed on how this sorting is done. Canter, Brown and Groat (1985) argue that:-

> "The rationale for this less restrictive version of the sorting process is the belief that the meanings and explanations associated with an individual's use of categories are as important as the actual distribution of elements into the categories."

While this process is clearly a less restrictive way of obtaining responses from subjects, the groupings into which subjects place elements often require verbal labels, either from the subject themselves or the researcher. The same verbal reason

given by two subjects for a particular sorting may not necessarily carry the same meaning for both subjects. However, the multiple sorting procedure does offer a useful way of understanding the way in which subjects construe differences between elements. The research reported in this thesis has adopted both the multiple sorting procedure and the semantic differential technique to investigate different aspects of the aesthetic and psychological responses to soiled and cleaned buildings. The multiple sorting procedure has been used to investigate the extent to which the soiling on building facades may influence the way in which buildings are construed. The non restrictive nature of the multiple sorting procedure makes it very suitable for this process. The semantic differential technique has been used to assess the differences in perception between identical buildings which vary in terms of their level of soiling. As a direct comparison between responses to different buildings was required, identical scales needed to be used when rating the different buildings. Thus supplied semantic differential scales were necessitated. In an attempt to avoid some of the difficulties associated with semantic differentials only those semantic differential scales which subjects felt could easily be applied to buildings were used. In the research reported in this thesis an attempt has been made to use the multiple sorting procedure and the semantic differential technique in a complementary fashion.

Chapter Eight

Multiple sorting task

INTRODUCTION

An initial question which needed to be addressed at the start of this investigation was whether the soiling of building facades is a means by which people conceptualise buildings. The effects which other surface features of facades (which might be affected by soiling), have on individuals' perceptions of buildings also needed to be considered. In order to begin to investigate these questions, a pilot study involving the use of the multiple sorting procedure was adopted.

As indicated in chapter 7 the multiple sorting procedure has been increasingly used in environmental psychology research in recent years. One of the main advantages of this technique for exploring individuals' conceptual systems is that it requires almost no structuring of the stimulus elements as is the case with other techniques (e.g. Repertory grids), and places no restrictions on the categorisation of responses. As Brenner, Brown and Canter (1985) point out, it requires little more than asking subjects to assign elements to categories of their own devising. The flexibility and lack of prestructuring of the elements makes it particularly useful in this context. The aim of this pilot study was to explore the ways in which buildings are conceptualised, and in particular, how the soiling of buildings and other surface features which might be affected by soiling, feature in these conceptualisations.

METHOD

Twenty six 8"x6" photographs of buildings were selected for the sorting task (Plates 8.1 to 8.26). These were drawn from a much wider range of photographs, the criteria for the selection of these buildings being to include:-

1. A range of different stone colours
2. Various levels of soiling on the facades
3. A range of different architectural styles and detail.

While not encompassing every combination of the above criteria, these buildings were thought to be reasonably representative of a range of sandstone buildings commonly found in urban areas. Evidence from previous multiple sorting research indicated that 26 was about the maximum number of photographs which subjects could be reasonably expected to handle.

The photographs were spread out on a table and subjects were read the instructions for the task. These were a modified form of those suggested in Brenner, Brown and Canter (1985). The instructions were:-

> I am carrying out a study of what people think and feel about buildings. So I am asking a number of people chosen at random to look at the following photographs of buildings and sort them into groups in such a way that all the pictures in any group are similar to each other in some important way and different from those in the other groups. You can put the buildings into as many groups as you like and put as many buildings into each group as you like. It is your views that count.
>
> When you have carried out a sorting, I would like you to tell me the reasons for your sorting and what it is that the buildings in each group have in common.

Subjects consisted of an opportune sample of 26 mature students and members of the public. For the most part the buildings were unfamiliar to subjects. The time taken to complete the sortings varied from 15 minutes to 2 hours, with most subjects taking 45 minutes to 1 hour.

RESULTS

The number of sorts produced varied between 3 and 21, with the average being about 6 or 7. Table 8.1 gives the results of the sorting criteria used by subjects.

Table 8.1 Multiple Sorting Task.

Sorting Criteria	Frequency
Architectural features/style	98
Function	27
Soiling/Condition	20
Evaluative	13
Environmental/Setting	11
Age/Architectural period	7
Materials/colour	7

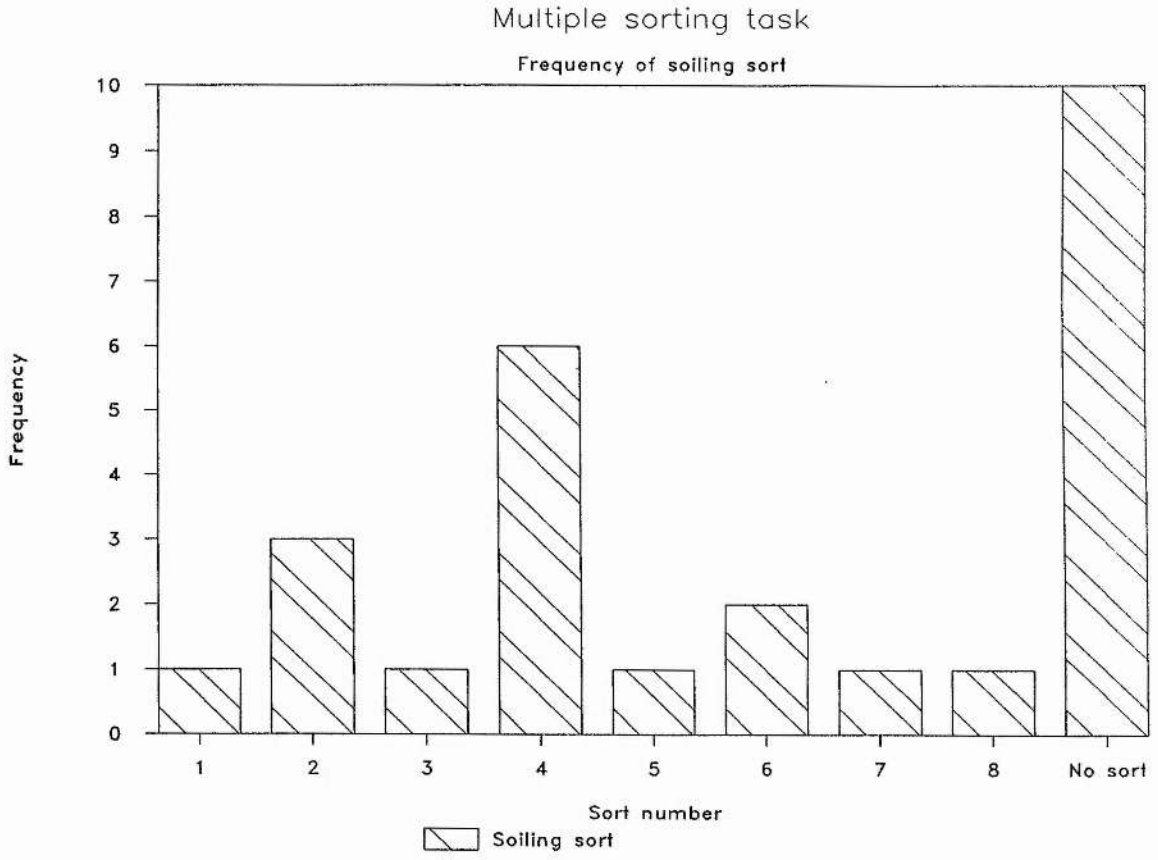
The most frequent type of sorts were those concerned with architectural feature of the buildings. Prominent amongst these were sorts concerning spires/towers (13), columns (11), nature and type of windows (11), and roofline features (11). Sorts according to other architectural features such as the presence of clocks (6), statues (4), flagpoles (1), railings (1), balconies (1), etc. were also made but to a lesser extent. Another major type of sort were those concerned with the shape and size of the buildings (12). Sorting criteria such as whether the buildings were essentially rectangular shaped or curved, or were to be read horizontally or vertically were used. The third major type of sorting in this category were those concerned with architectural style and character (13). Typically, subjects would group the

buildings into architectural styles e.g. Gothic, Neo-Classical, Victorian, Georgian, etc. or simply according to whether the architecture was traditional or innovative. Although the main grouping of sorts concerned architectural style, the single most frequently occurring sorting criteria was that of the function or use of buildings. Approximately 70% of subjects (18) sorted according to the use of the building e.g. residential, offices, commercial etc. A smaller number of sorts (6) concerned dual usage and ownership of buildings.

The second most frequently used individual sorting criteria concerned soiling. A total of 61.5% of subjects (16) sorted according to the level of soiling on the buildings. Three sorts were done according to the state of dereliction of the buildings. Dereliction tended in part to be reflected by soiling. Sorting according to soiling level usually took the form of either using the criteria of clean/dirty, or whether the buildings needed cleaning or not. One subject sorted twice using both criteria, and another made the distinction between those that were enhanced by soiling and those that were not. Figure 8.1 shows the sort number where the soiling sort occurred.

Brenner, Brown and Canter (1985) suggest that there may be some significance in the ordering of sorts. Typically those which occur earlier may be more salient to individuals than those which occur later. Of the seventeen subjects who used soiling as a criteria for sorting, two did so within their first third of sorts, eight did so within their second third of sorts, and seven did so within their final third of sorts. These results suggest that soiling is a salient feature of the way in which buildings are construed. After the function of buildings, it was the second most commonly used sorting criteria.

Figure 8.1 Sort number where soiling sort occurred. Histogram shows frequency of soiling sort vs. sort number.



The principal aim of the multiple sorting task was to focus on the use (or non use) of soiling/clean sorts. The way in which individuals sorted the buildings in terms of this criteria can be explored by smallest space analysis (SSA-1). Smallest space analysis is part of a suite of computer programs in the Guttman-Lingoes series of multidimensional scaling procedures. Shapira (1976) describes the SSA procedure as follows:-

> 'This analysis provides a geometric representation of the different variables as points in an Euclidean space. The distance between pairs of points in the space correspond to the correlation of the variables. Hence two points are closer if the correlation between the corresponding variables is higher'.

The coefficient of alienation is a measure of the degree of stress encountered by the program in trying to position the data points, according to the calculated correlations, in the dimensional space. In environmental psychology solutions which have coefficients of alienation below .15 have generally been deemed acceptable.

Figure 8.2 gives the SSA-1 plot for the soiled/clean sorts. The space can be partitioned into three regions, one region containing buildings which tended to be categorised as soiled, a second region containing a group of buildings generally categorised as clean, and a third region containing buildings which tended to be more inconsistently sorted. The group containing buildings which were clearly identified as soiled or needing cleaning, included St John's Church, Edinburgh (Plate 8.1), Sir Walter Scott Monument, Edinburgh (Plate 8.2), Royal High School, Edinburgh (Plate 8.6), Holland Street, Glasgow (Plate 8.12), Watson Street, Glasgow (Plate 8.13), City Chambers extension, Glasgow (Plate 8.15), Ingram

Street, Glasgow (Plate 8.21), St Vincent St. Church, Glasgow and Sauchiehall Street, Glasgow (Plate 8.25). Interestingly the Alliance and Leicester Building Society building on the junction of Hope Street and Bath Street, Glasgow (Plate 8.7) was also classified by all but one subject who sorted according to soiling, as being dirty or needing cleaning. This building has already been cleaned, but the large areas of heavy iron staining and poor quality of the stonework seem to have given the impression of a dirty building.

As with the soiled grouping a number of buildings were classified together as having been cleaned, these included the Usher Hall, Edinburgh (Plate 8.3), Trongate, Glasgow (Plate 8.8), Hope Street, Glasgow (Plate 8.14), City Chambers, Glasgow (Plate 8.16), Caledonian Hotel, Edinburgh (Plate 8.17), Kelvingrove Art Gallery, Glasgow (Plate 8.20), Post Office, Glasgow (Plate 8.23), Trongate/Glassford Street, Glasgow (Plate 8.24) and Ingram Street Hospital, Glasgow (Plate 8.26). A number of buildings (Gayfield Place, Edinburgh Plate 8.4, Royal Mile mansions, Edinburgh Plate 8.5, Wilson Street, Glasgow Plate 8.10, Scottish National Portrait Gallery, Edinburgh Plate 8.18, Donaldsons School Plate 8.19, Post Office, Glasgow Plate 8.22) were more inconsistently sorted in terms of soiled vs clean. The SSA-1 plot shows that Gayfield Place, Edinburgh (Plate 8.4) and Wilson Street, Glasgow (Plate 8.10) are closer to the grouping of soiled buildings, whereas Edinburgh (Plate 8.18), Donaldsons School (Plate 8.19), and Post Office, Glasgow (Plate 8.22) are closer to the grouping of clean buildings. Royal Mile mansions, Edinburgh (Plate 8.5) occupies a position closer to the grouping of cleaned buildings but essentially in between the two main clusters. The positioning of Royal Mile Mansions, Edinburgh (Plate 8.5), Scottish National Portrait Gallery, Glasgow (Plate 8.18) and Donaldsons School for the Deaf, Edinburgh (Plate 8.19)

Figure 8.2 SSA-1 plot for the soiled/clean sorts.

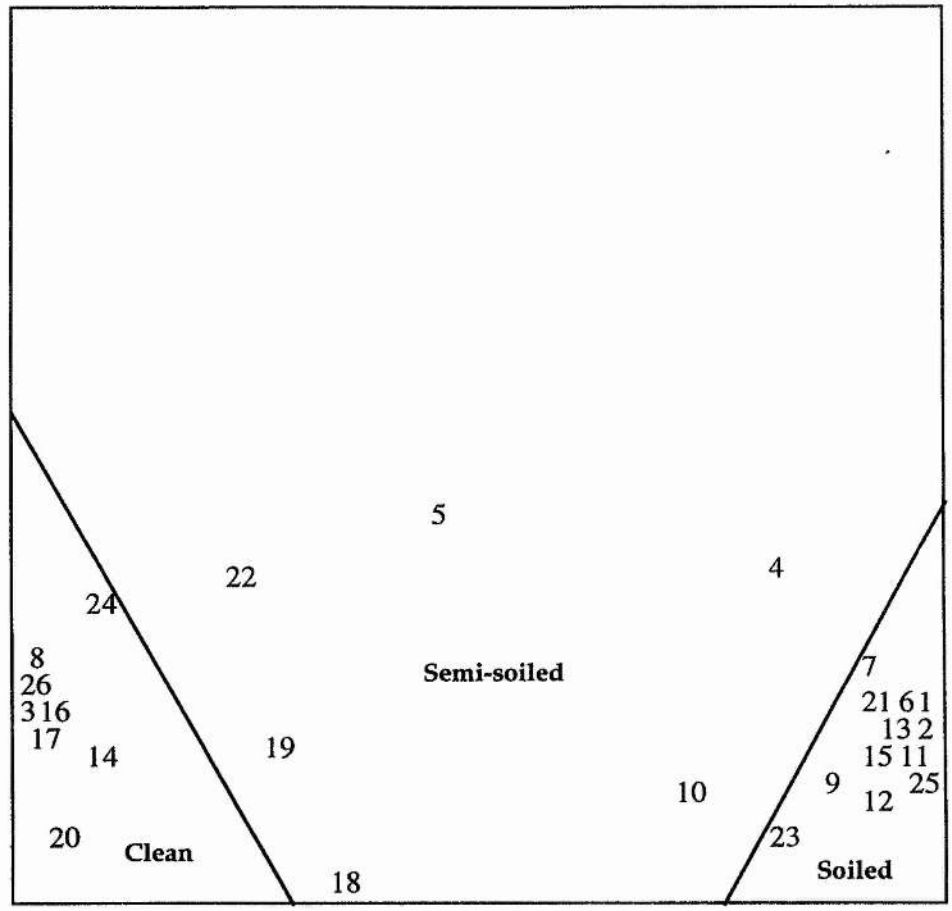


Figure 8.2 SSA-1 Multiple sorting task. Soiling sorts
Coefficient of alienation .06032

on the plot is interesting, as it shows there was a general tendency to place these buildings in the clean category when sorting according to soiling. All three have appreciable amounts of soiling on their facades. However, the soiling is distributed in such a way as to appear to be either consistent with the texture of the stone or to enhance the architectural details of the buildings by providing a contrast to the lighter coloured surrounding stone. In the event the soiling on these buildings has tended not to be seen as dirt, as these buildings have generally been sorted into the clean category.

A fourth major sorting criterion used by subjects was an evaluative one. Subjects sorted according to whether the buildings were aesthetically pleasing, attractive, inviting or simply if they liked the buildings. This sorting criteria can also be explored using smallest space analysis. Figure 8.3 gives an SSA-1 plot of the 26 buildings according to the aesthetic sorts used by subjects. This plot shows a general tendency for aesthetic clustering to correspond to the level of soiling, with cleaned buildings generally being categorised as aesthetically pleasing. One group of buildings which included Gayfield Place, Edinburgh (Plate 8.4), King Street, Glasgow (Plate 8.9), Wilson Street, Glasgow (Plate 8.10), Elgin Place Congregational Church, Glasgow (8.11), Watson Street, Glasgow (Plate 8.13), Ingram St., Glasgow (Plate 8.21), City Chambers Extension, Glasgow (Plate 8.15) which were soiled, also tended to be categorised as aesthetically displeasing. However, the Alliance and Leicester Building Society building on the junction of Hope Street and Bath Street, Glasgow (Plate 8.7) and Hope Street, Glasgow (Plate 8.14) which have both been cleaned, also tended to be seen as aesthetically displeasing. It may be that the residual staining which has remained after cleaning on the facade of the building society building has contributed to the

aesthetically displeasing nature of this building. The rather bland architecture of the building on Hope street possibly accounts for the way in which it was sorted. Another cluster of buildings including Usher Hall, Edinburgh (Plate 8.3), City Chambers, Glasgow (Plate 8.16), Kelvingrove Art Gallery, Glasgow (Plate 8.20), and Trongate, Glasgow (Plate 8.8), which have been cleaned, were also seen as aesthetically pleasing. Interestingly two heavily soiled buildings, St John's Church, Edinburgh (Plate 8.1) and Sir Walter Scott Monument, Edinburgh (Plate 8.2), as well as a number of partially soiled buildings including Donaldsons School for the Deaf, Edinburgh (Plate 8.19) and Royal mile mansions, Edinburgh (Plate 8.5) were seen as aesthetically pleasing.

The SSA-1 plot seems to show that, at least for the buildings used in this sorting task, there is a general tendency for cleaned buildings also to be seen as aesthetically pleasing. In some cases buildings can also construed as aesthetically pleasing even if they are soiled. The analysis shows that the cleaning of a buildings facade does not necessarily result in it being judged aesthetically pleasing.

Another set of sorting criteria used were concerned with the environmental setting of the buildings. These were mainly concerned with what surrounded the buildings in terms of greenery, or the street context in which the buildings occurred. Age or architectural period was another type of sorting procedure used by subjects. Two subjects sorted into architectural period while the rest grouped the buildings simply into approximate ages. Stonework colour was also a criteria used by six subjects to sort the buildings. Colour is clearly affected by the soiling present on buildings.

Figure 8.3 SSA-1 plot of aesthetic sorts.

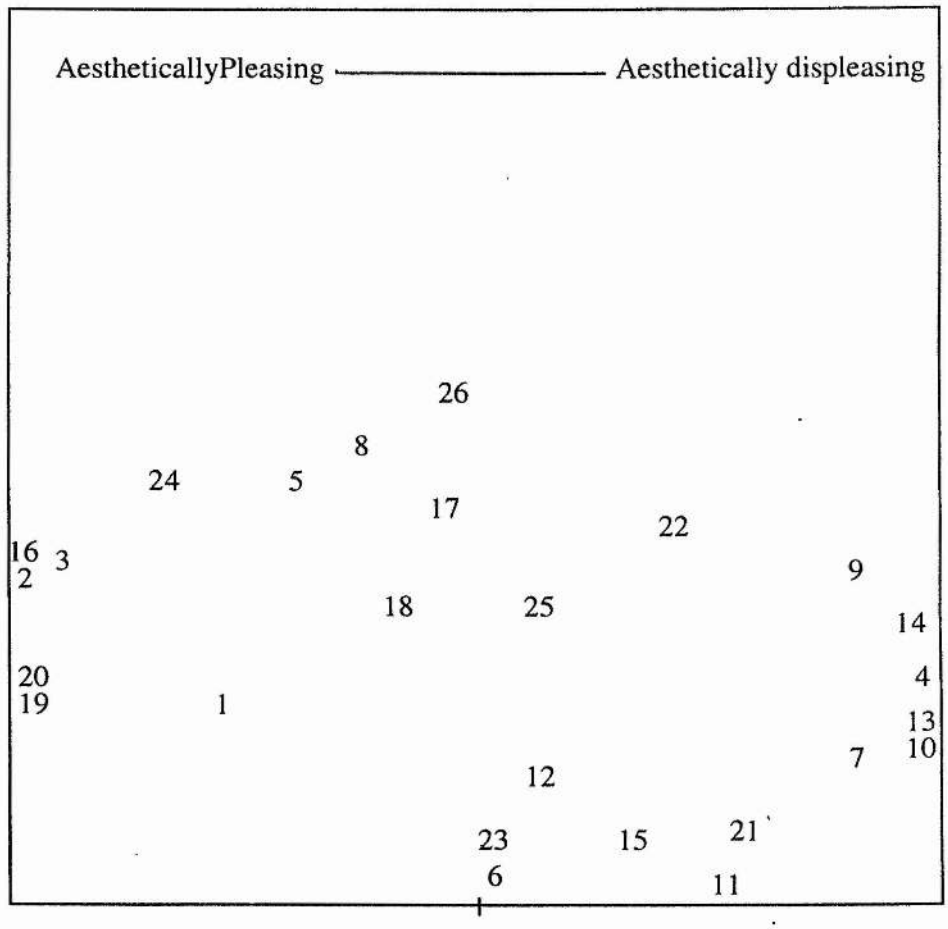


Plate 8.3. SSA-1 Multiple sorting task. Aesthetic sorts.
Coefficient of alienation .06234

The multiple sorting task revealed that soiling is a consistent means by which subjects conceptualise buildings. In terms of individual sorting criteria it was the second most frequently used sort, although typically it tended not to be amongst the first sortings produced. The results also suggest that moderate levels of soiling can be present on a building, while the building itself is still seen as clean. Conversely buildings which have been cleaned can be seen as still being dirty, if staining remains. There is a tendency for aesthetic evaluations to be related to cleaning, although the smallest space analysis reveals that there are important exceptions to this general tendency.

Plate 8.1 Church of St John the Evangelist, Princes St., Edinburgh.

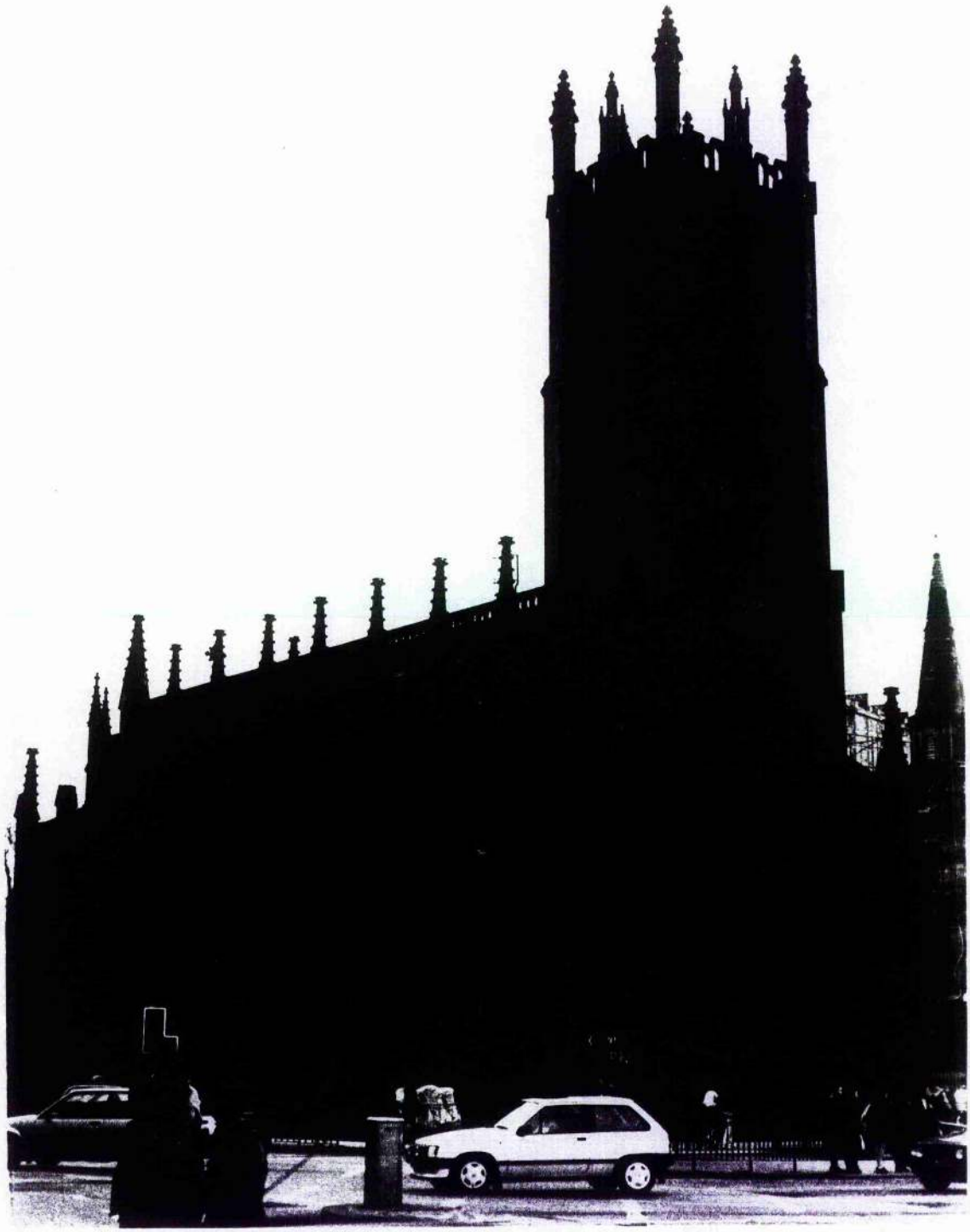


Plate 8.2 Scott Monument, Princes St., Edinburgh

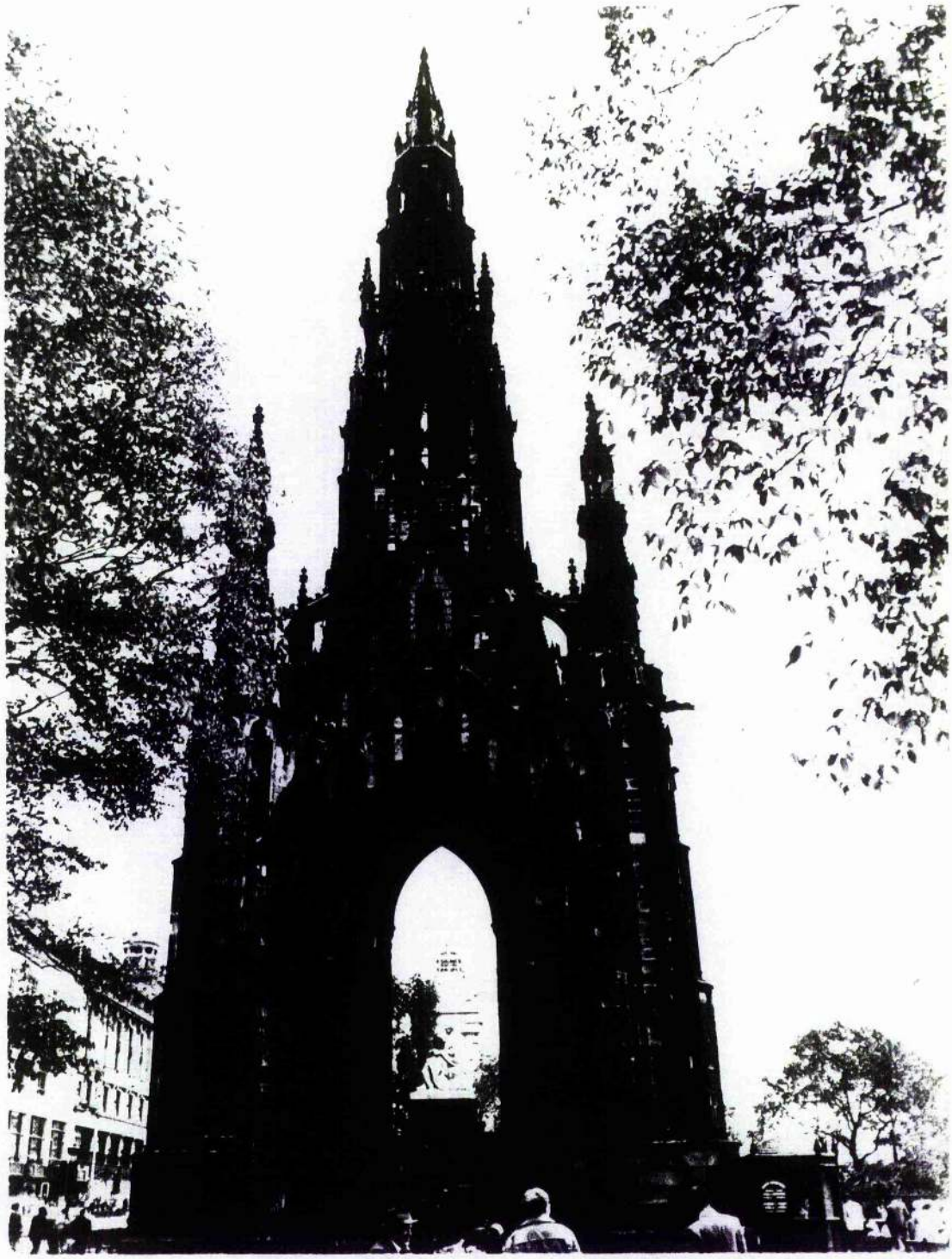


Plate 8.3 Usher Hall, Edinburgh.

Plate 8.4 Gayfield Place, Leith Walk, Edinburgh.

Plate 8.5 Royal Mile Mansions, Royal Mile, Edinburgh.

Plate 8.6 Royal High School, Edinburgh.

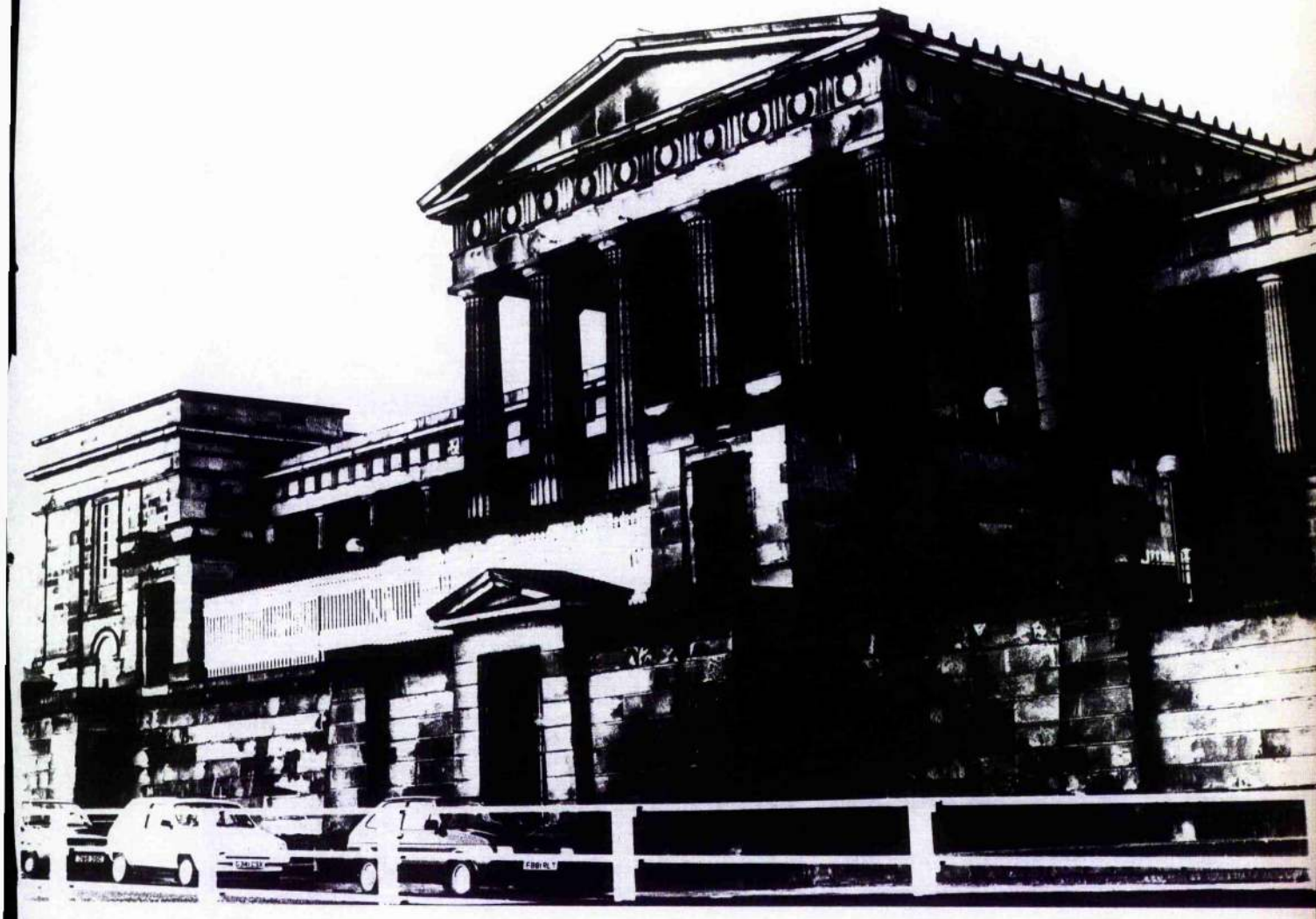


Plate 8.7 Alliance & Leicester Building Society, Bath St., Glasgow.

Plate 8.8 Bank of Scotland, Trongate, Glasgow.

Plate 8.9 King St., Glasgow.

Plate 8.10 Wilson St., Glasgow.

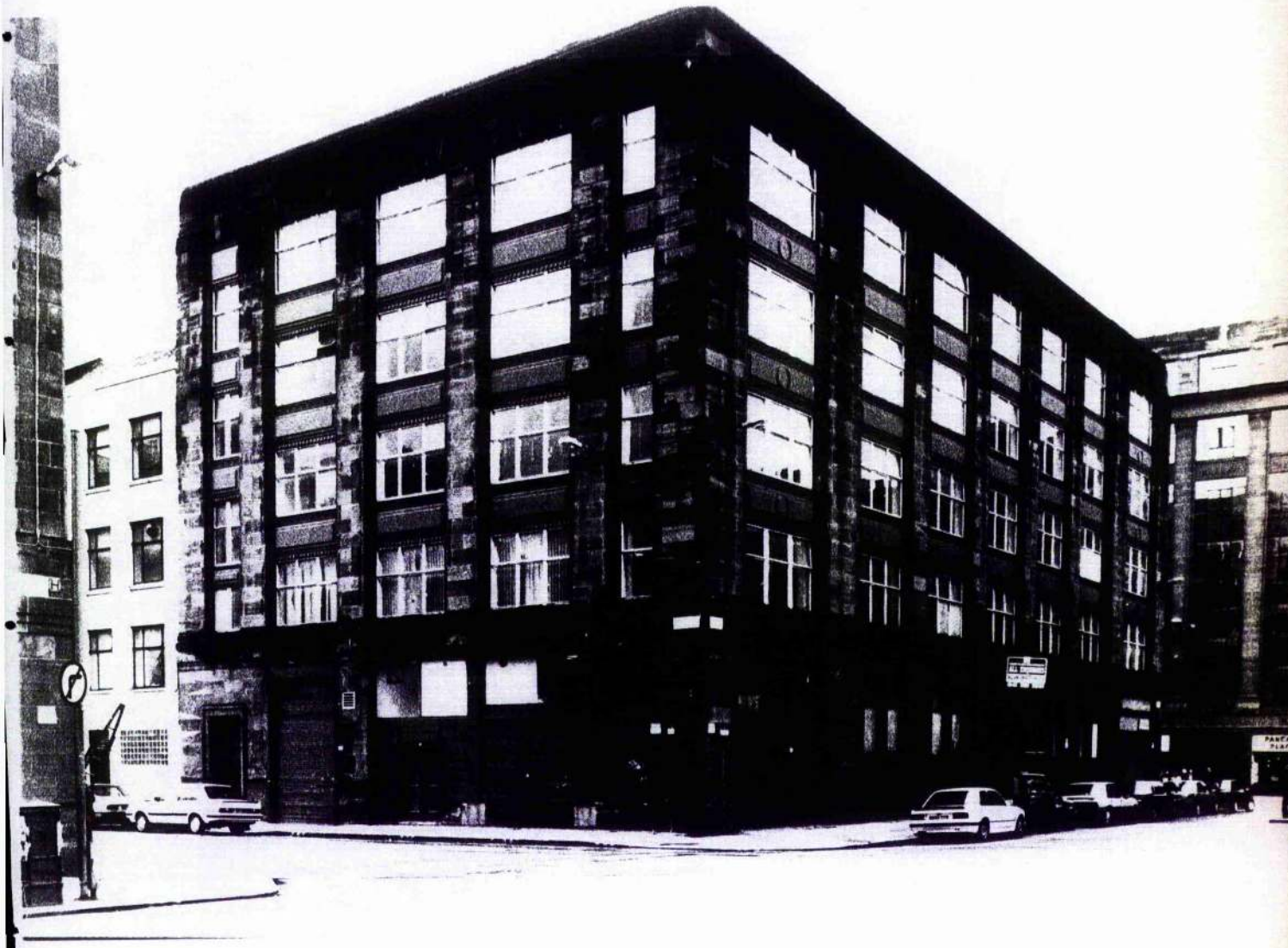


Plate 8.11 Elgin Place Congregational Church, Bath Street, Glasgow.

Plate 8.12 Holland St., Glasgow.

Plate 8.13 Watson St., Glasgow.

Plate 8.14 Hope St., Glasgow.

Plate 8.15 City Chambers Extension, Glasgow.

Plate 8.16 City Chambers, Glasgow.

Plate 8.17 Caledonian Hotel, Edinburgh.

Plate 8.18 Scottish National Portrait Gallery, Edinburgh.

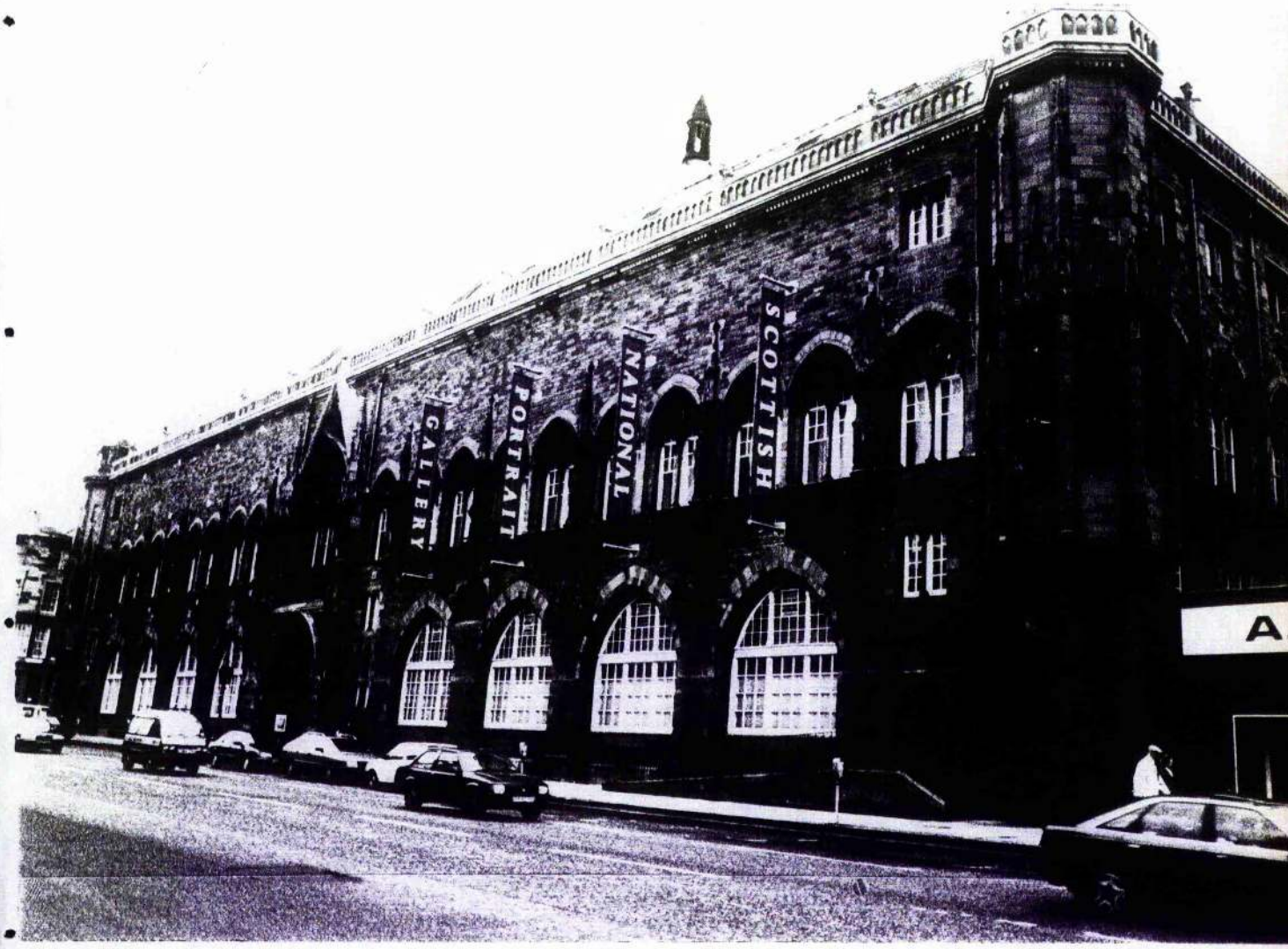


Plate 8.19 Donaldsons School for the Deaf, Edinburgh.

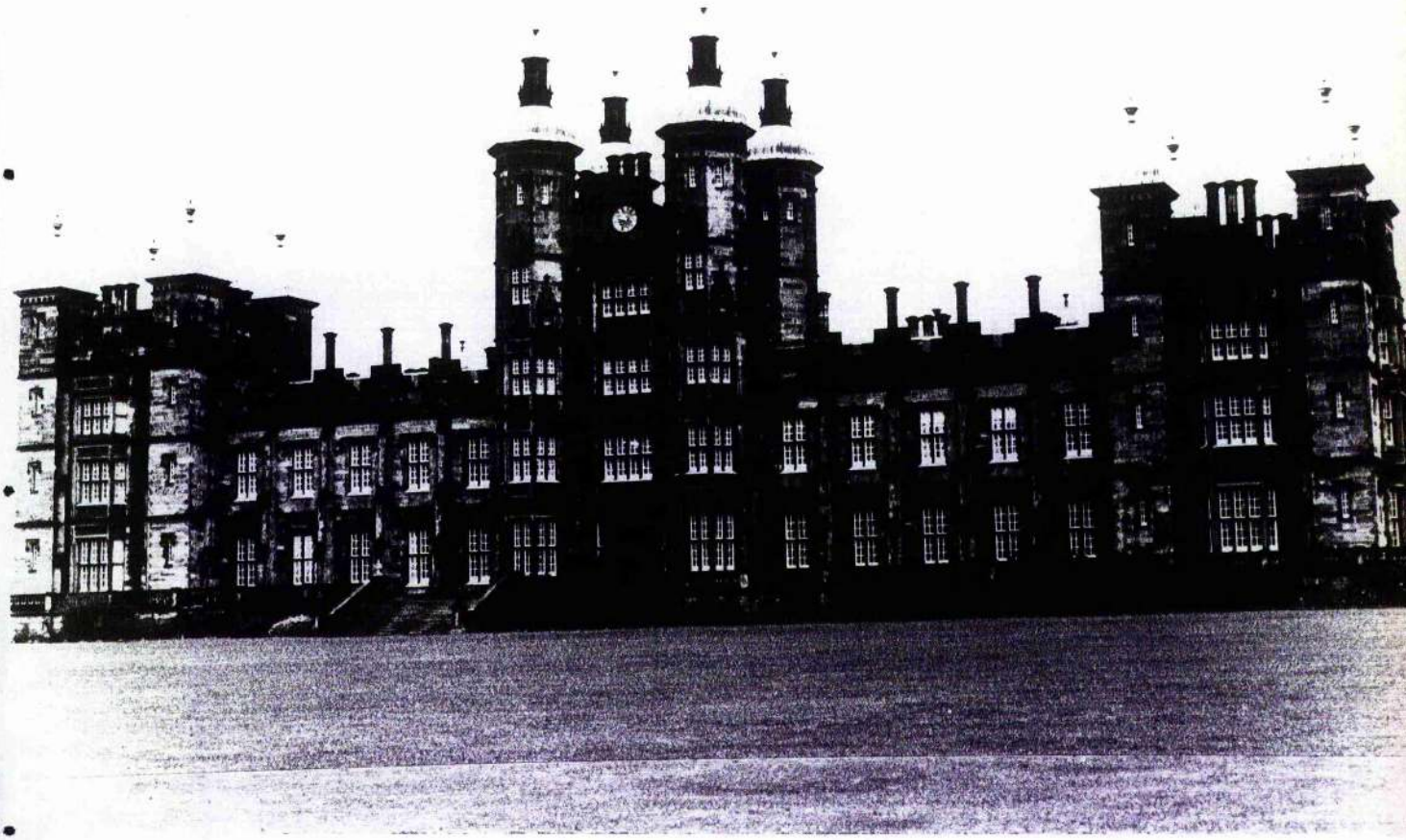


Plate 8.20 Kelvingrove Art Gallery, Glasgow.

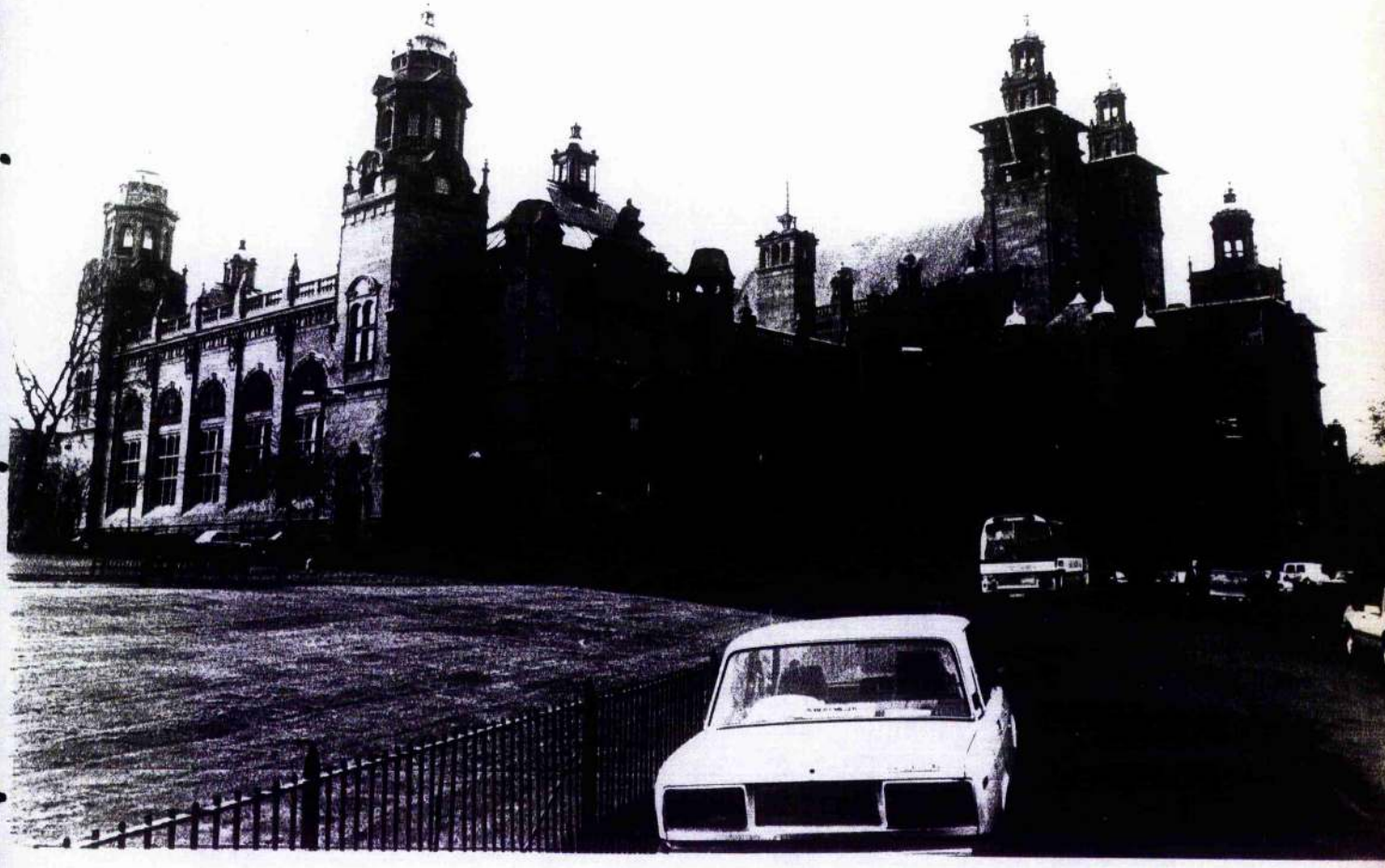


Plate 8.21 Ingram St., Glasgow.

Plate 8.22 Post Office, George Square, Glasgow.

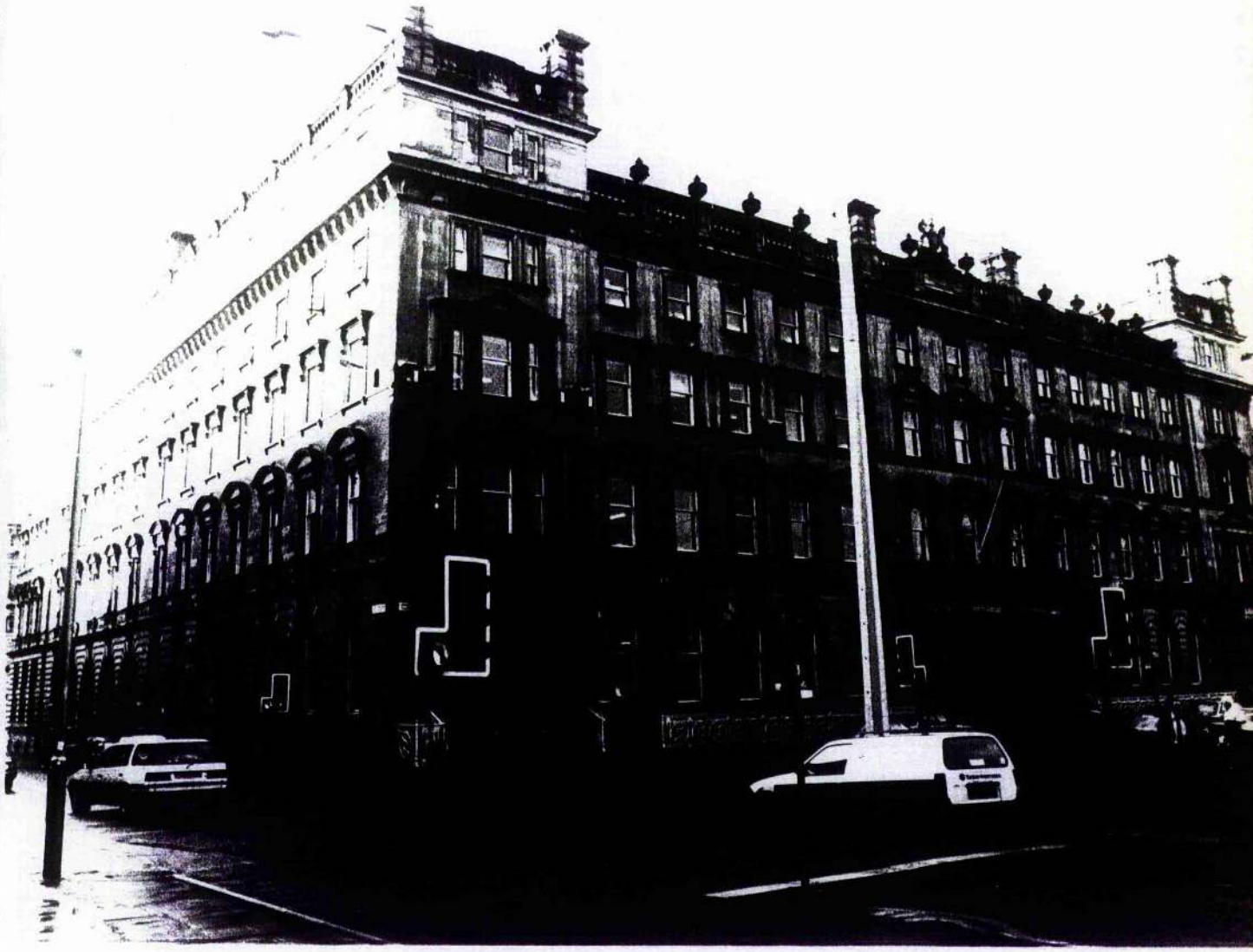


Plate 8.23 St Vincent St. Church, Glasgow.

Plate 8.24 Trongate/Glassford St., Glasgow.

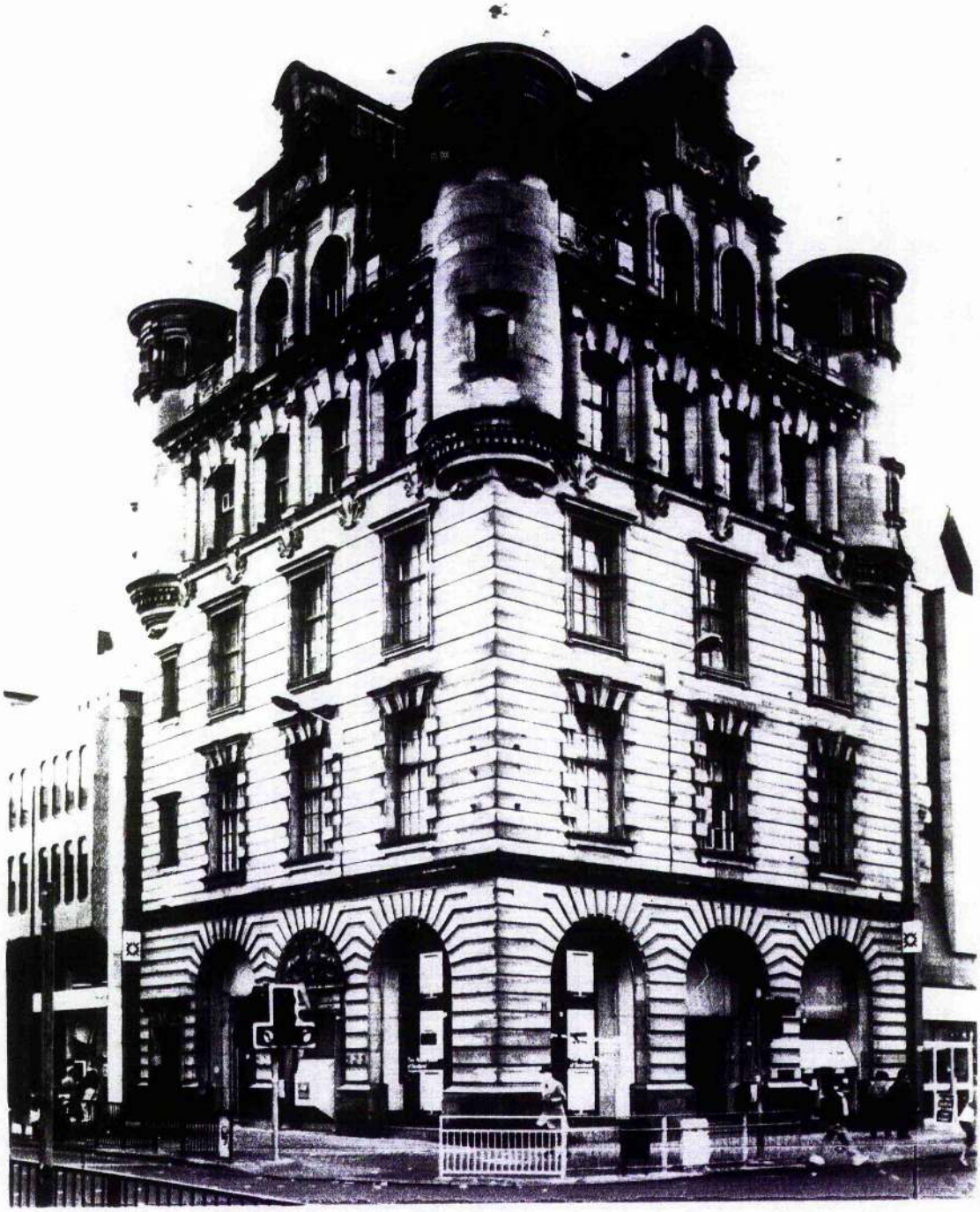
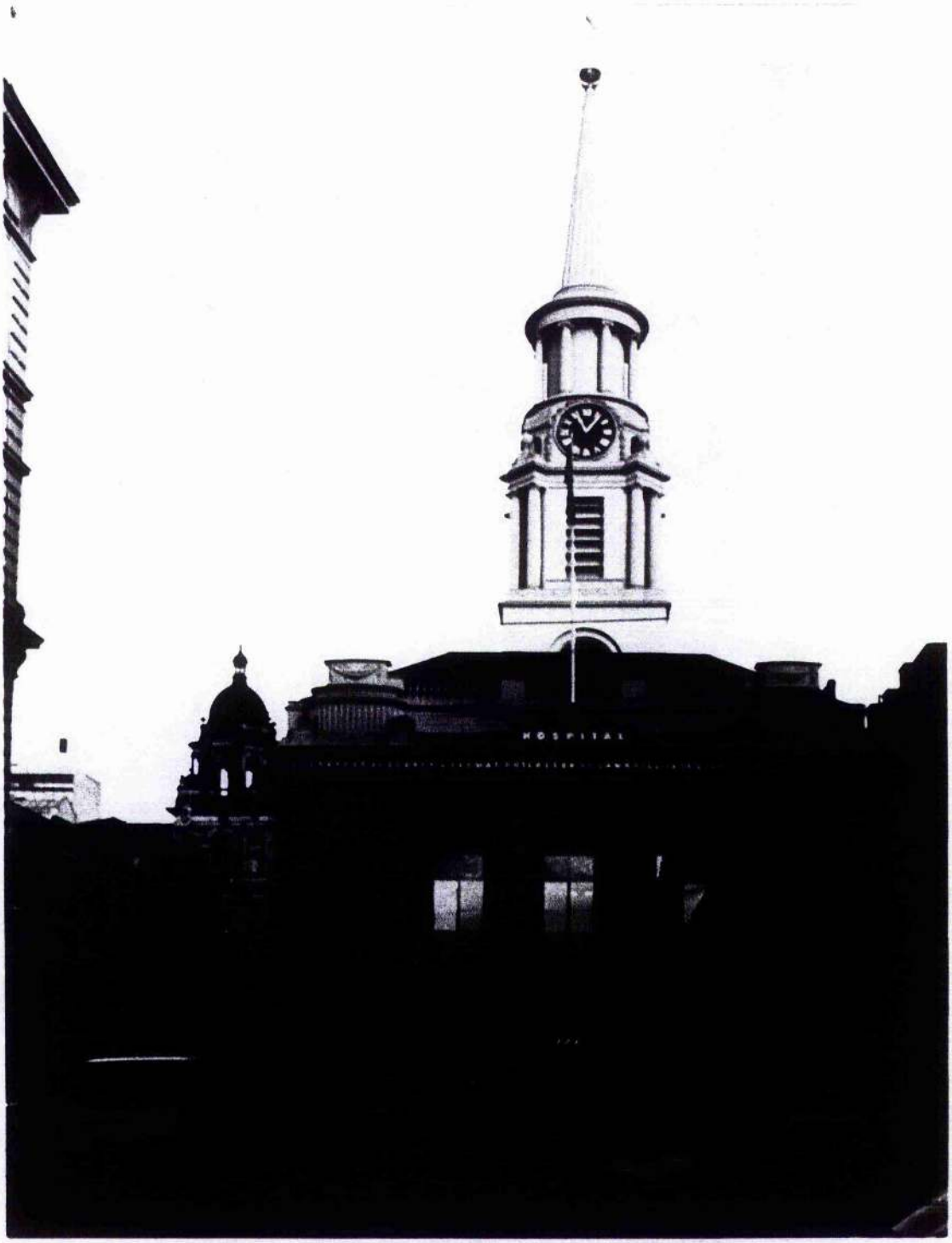


Plate 8.25 Sauchiehall St., Glasgow.

Plate 8.26 Ingram St. Hospital, Glasgow.



Chapter Nine

Appraisal of buildings before and after cleaning

INTRODUCTION

The multiple sorting task revealed that soiling was a major way in which people conceptualise buildings. In order to ascertain what effect soiling has on the perception of buildings a larger scale study was initiated, its aim being to measure as precisely as possible the effect which cleaning has on the appraisal of buildings. A literature search revealed only one study which directly addressed this question that of Steffan (1988) previously discussed in chapter four. Verhoef (1988) in reporting this study suggests:-

> "For the continued studies a repeated investigation of different buildings should be carried out directed at the difference in experience value of form identical facades in clean and dirty situations. Similar investigations could take place with the help of a series of buildings where the facade is clearly distinguished by the intensity of the dirtiness and/or by the different forms in which the dirtiness is found."

In practice finding identical facades which differ only in their level of soiling is extremely difficult. Ideally to measure the effect soiling has on building evaluation, a range of different building types with varying degrees and patterns of soiling, would need to be evaluated before cleaning took place, and subsequently after facade cleaning had been carried out. In reality this is very difficult to achieve. A number of problems arose when trying to identify buildings suitable for this appraisal study.

1. Timescale

The timescale for finding a suitable range of buildings for the study, waiting for the necessary planning permission for cleaning to be granted and the subsequent cleaning to take place was prohibitive.

2. Other changes to cleaned buildings

Buildings are rarely just stonecleaned. While scaffolding is in place the opportunity is often taken to replace windows and doors, frequently in a different style or colour from the original. Other changes to the exterior can also be made, for example to roofs. Even interior features such as blinds and curtains, which can be seen from outside the building and thus influence perception, can be changed. All these effect the external appearance of the building and are in addition to the stonecleaning. This produces additional variance which is difficult to control.

3. Soiling and the results of cleaning

No two buildings are soiled in an identical fashion. The level of soiling and its distribution on building facades can vary considerably, it therefore becomes difficult to talk in general terms about the evaluation of dirty buildings. Similarly, the results of cleaning can be very varied. Buildings cleaned by different methods can vary in surface appearance, colour, residual staining, etc. Making generalisations about cleaned buildings is therefore equally difficult.

The multiple sorting task revealed that buildings which are cleaned but still show considerable amounts of residual soiling can be construed as still soiled. Each example of cleaning needs to be considered in terms of the level and nature of the soiling, and the appearance after cleaning, rather that in the general terms of

simply clean or dirty. For the purposes of this research, it was not possible to manipulate the soiling on building facades or indeed the visual appearance after cleaning, buildings available in the real environment had to be used as examples of soiled and cleaned buildings.

In view of these various difficulties a decision was taken to try to identify architecturally similar buildings which, as far as possible, varied only in terms of their level of soiling. In effect, examples of particular types of buildings before and after cleaning were sought. Each example of pairs of buildings (before and after cleaning), selected for this study occurred in the same street, and in most cases the buildings occupying positions adjacent to each other. Only buildings which were considered to have the least additional variance beside soiling were used.

The selected buildings were photographed using a 35mm camera and, where possible, an architectural shift lens was employed to reduce the problem of converging verticals on the photographic image. In two cases it was possible to further reduce variance in the pairs of buildings caused by differences in windows and doors, by manipulating the actual photographic print. In the case of 173 Great Northern Road (Plate 9.26), this building had not only been cleaned but the doors and windows had been replaced and were in considerably better condition than those on 171 Great Northern Road (Plate 9.25), the soiled building with which it was to be compared. The windows and doors in the photograph of 171 Great Northern Road were replaced by those cut carefully from a photograph of 173 Great Northern Road. In the case of Broughton House (Plate 9.5) the entire lower portion of the building was manipulated in a similar manner.

There was still some additional unavoidable variance in the pairs of buildings used in this study, but as far as possible this was kept to a minimum. Any small effects which any confounding variance might have had on the evaluation of the buildings, might reasonably be expected to be randomly distributed between the soiled and cleaned examples.

METHOD

In order to compare responses to the photographs of the before and after cleaning buildings, the semantic differential technique was used. A search through the literature on building evaluation using the semantic differential technique revealed a total of 63 semantic differential scales used in previous studies. The final selection of semantic differentials to be used in any given study of environmental evaluation is usually done by the researcher, the aim being to use a range of semantic differentials which covers, as far as possible, the variance of semantic meaning. The semantic differentials must be carefully selected by the researcher to suit his purpose. Osgood, Suci, & Tanenbaum (1957) identified three factors in aesthetic judgement by means of semantic differentiation namely activity, evaluation and potency. Environmental perception research using the semantic differential technique has tended to use factors drawn from all three dimensions.

In order to cover the range of possible changes in perception which might result from the cleaning of the various buildings selected for study, it was thought useful to use a relatively large number of semantic differentials. The final list was arrived at by giving five independent judges the list of 63 semantic differentials

which had been used in previous building evaluation research, along with examples of the photographs of the buildings to be used in the study. The judges were asked to rate on a three point scale how easy or difficult they would find it to evaluate the buildings on each of the semantic differentials. By doing this those semantic differential scales which had less meaning for the subjects, or were difficult to apply to building evaluation could be eliminated.

Another consideration to be made was the experimental situation when the semantic differentials were to be used. Using a considerable number of semantic differentials coupled with a large number of stimulus items to be evaluated can quickly result in fatigue and boredom effects. Krampen's (1979) research led him to suggest that asking subjects to make about 22 individual semantic differential decisions of 18 photographs was about the maximum possible without fatigue effects. With this as a guideline the data from the independent judges was used to make the final selection which covered, as far as possible, the range of environmental meaning.

The decision was taken to use a related design (i.e. the same subject making evaluations of a building in both its soiled and clean state). Initial trials indicated that if subjects were presented with the before and after photographs sufficiently far apart in the sequence of buildings to be evaluated they were generally unaware of the pairings. The exception to this was the photograph of Broughton House which, because of its distinctive blue ground floor and the name of the building being the same in both photographs, was recognised as being similar. This pair of buildings (Plates 9.5 & 9.6) were therefore evaluated in an unrelated design procedure.

Subjects were shown the buildings in groups of between 8 and 11, in the form of slides to larger groups or as photographs to individuals, and were asked to evaluate each in terms of the semantic differentials. Prior to the first building being shown, subjects were given instruction on the seven point semantic differential scale. In addition, after completion of the appraisal they were asked to estimate the date of construction of each building. The whole procedure took approximately 25 to 40 minutes to complete. Subjects were mainly undergraduates, or mature students doing evening classes. In order to broaden the subject base an opportune sample of non students was also included.

In total thirteen sets of buildings were appraised by subjects. These were:-

2-3/4-5 La Belle Place, Glasgow (Plates 9.1 & 9.2)
74/84 Haymarket Terrace, Edinburgh (Plates 9.3 & 9.4)
Broughton House, Broughton Road, Edinburgh (Plates 9.5 & 9.6)
93-97/99-103 East Claremont Street, Edinburgh (Plates 9.7 & 9.8)
23/25 Rutland Street, Edinburgh (Plates 9.9 & 9.10)
25/26 Walker Street, Edinburgh (Plates 9.11 & 9.12)
58/60 Palmerstone Place, Edinburgh (Plates 9.13 & 9.14)
6/8 Palmerstone Place, Edinburgh (Plates 9.15 & 16)
40/46 Charlotte Square, Edinburgh (Plates 9.17 & 18)
12-13/14-15 Royal Terrace, Glasgow (Plates 9.19 & 9.20)
3/4 Magdala Crescent, Edinburgh (Plates 9.21 & 9.22)
5/7/9 Park Circus Place, Edinburgh (Plates 9.23 & 9.24 & 9.25)
171/173 Great Northern Road, Aberdeen (Plates 9.26 & 9.27)

A brief description of each of these buildings is given before the analysis of the semantic differential ratings.

RESULTS

Data from the semantic differential appraisals of the sets of buildings were analysed using the Minitab computer program. Analysis was done by means of the Wilcoxon test and Mann Whitney test.

2/3 & 4/5 La Belle Place, Glasgow

(Plates 9.1 & 9.2)

La Belle Place is a short street between Clairemont Gardens and Royal Terrace in the Kelvingrove Park area of Glasgow. The two sandstone buildings selected for study are adjacent to each other on the street and are architecturally very similar in terms of design and carved detail on the stonework.

The buildings were designed by Charles Wilson and built in 1857, the main architectural difference between the two being the slightly different shape of the bay windows at the sides of the buildings. Both building are used as offices.

Both 4 and 5 La Belle Place are heavily soiled. Some individual stones have become very dark and there is evidence of heavy iron staining on stones along the roofline of the building. The block containing 2 and 3 La Belle Place appears to have undergone chemical cleaning. The result of this cleaning has been to leave the stone an orange-brown colour. The indentation of new, paler coloured stones has produced a patchwork effect on parts of the facade. Staining caused by water run-off is apparent, particularly below the sills at ground level. Cleaning has also revealed the extent of the iron staining on stonework along the parapet.

Discussion

The results of the Wilcoxon analysis of the La Belle Place data (Figure 9.1) revealed significant differences at the 1% or 5% level on all of the semantic differentials. The difference in evaluation of the semantic differentials between

the soiled and cleaned facade was one of the largest of any of the pairs of buildings considered. This appears to be due to the mainly very positive evaluations given to the cleaned facade of 2/3 La Belle Place. In addition, the heavy soiling coupled with the orange iron staining on the facade of 4/5 La Belle Place has produced high ratings on the dimensions of "gloomy", "cold", "hard", "dirty", "dark" and "displeasing colour".

There has also been a tendency to view the cleaned building as slightly younger than the soiled one.

Plate 9.1 4/5 La Belle Place, Glasgow.

Plate 9.2 2/3 La Belle Place, Glasgow.

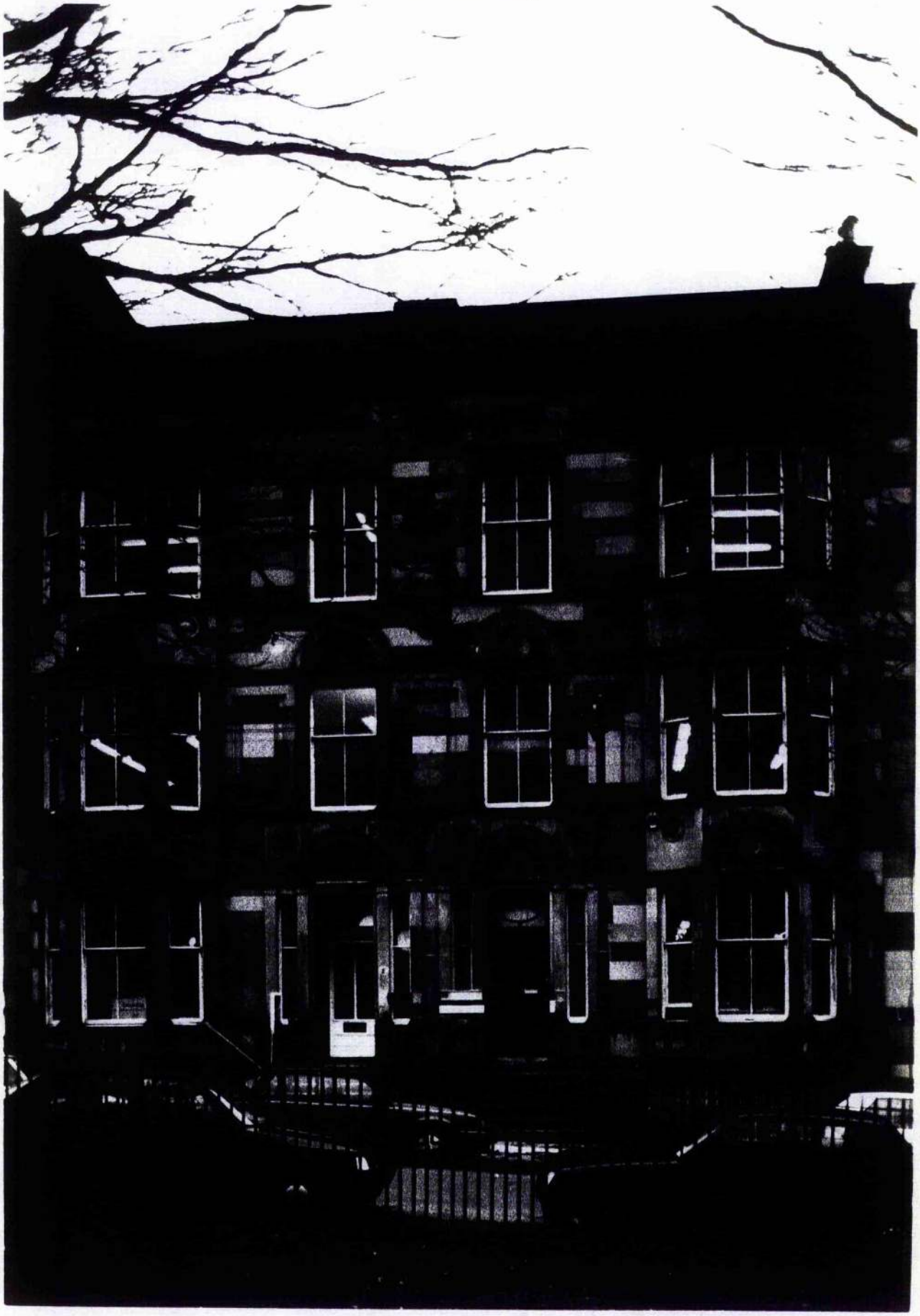


Figure 9.1 Comparison of soiled and cleaned buildings in La Belle Place, Glasgow

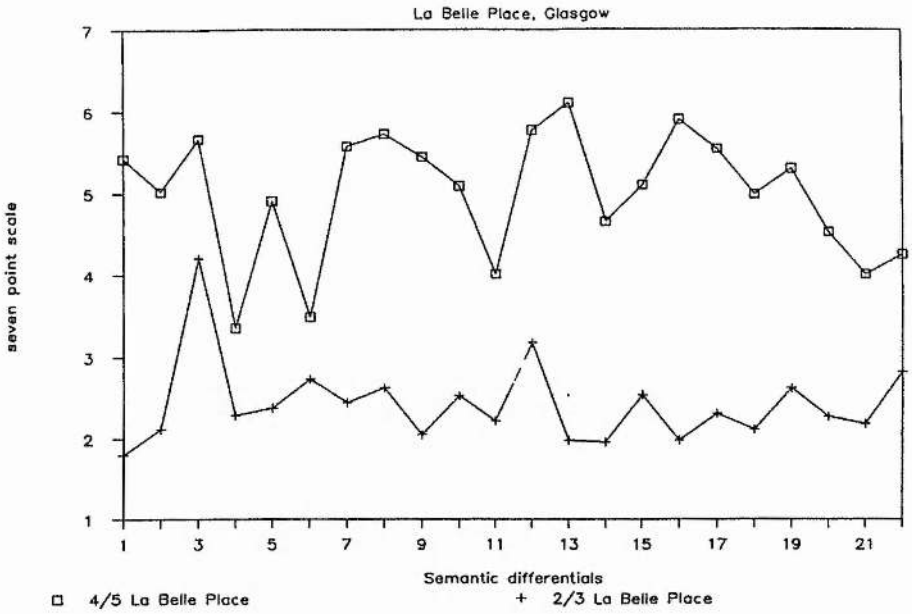


Table 9.1 4-5 La Belle Place, Glasgow

N=45 Analysis:- Minitab. Wilcoxon test.

	1 2 3 4 5 6 7	P-VALUE
1.	Well looked after ..... Shabby	0.000**
2.	Impressive ..... Unimpressive	0.000**
3.	Delicate ..... Weighty	0.000**
4.	Distinctive ..... Ordinary	0.000**
5.	Inviting ..... Repelling	0.000**
6.	Orderly ..... Irregular	0.012*
7.	Cheerful ..... Gloomy	0.000**
8.	Warm ..... Cold	0.000**
9.	Attractive ..... Unattractive	0.000**
10.	Delightful ..... Dreadful	0.000**
11.	Has character ..... Has no character	0.000**
12.	Soft ..... Hard	0.000**
13.	Clean ..... Dirty	0.000**
14.	Tidy ..... Untidy	0.000**
15.	Friendly ..... Unfriendly	0.000**
16.	Light ..... Dark	0.000**
17.	Pleasing colour ..... Displeasing colour	0.000**
18.	Elegant ..... Clumsy	0.000**
19.	Uplifting ..... Depressing	0.000**
20.	Dignified ..... Undignified	0.000**
21.	High status ..... Low status	0.000**
22.	Unique ..... Common	0.000**

Estimated mean age of buildings

2/3 La Belle Place 1892 S.D. 38.0
4/5 La Belle Place 1876 S.D. 41.9

Wilcoxon test P-Value = 0.008**

* significant at 5% level
** significant at 1% level

74/84 Haymarket Terrace, Edinburgh

(Plates 9.3 & 9.4)

The buildings selected for study in Haymarket Terrace are typical of much of the type of property often stonecleaned in urban areas. The original sandstone ground floor facades have been removed or significantly altered to accommodate retail premises, while the upper floors retain their original appearance. The two buildings are adjacent to each other on Haymarket Terrace and are architecturally identical, although the shop frontages on the ground floor show clear differences.

The facade of 84 Haymarket Terrace is heavily soiled, possibly due to its proximity to the railway line. The soiling is relatively evenly distributed on the surface, although it appears particularly heavy on the chimneys and under some of the sills. The facade of 74 Haymarket Terrace has been stonecleaned, resulting in a relatively even colouration with no obvious signs of surface staining. Some light soiling is apparent mainly on the chimneys and below the sills of the upper storey. It is difficult to judge whether this was soiling which was not removed by cleaning, or whether it has accumulated since stonecleaning took place.

Discussion

The results of the Wilcoxon analysis of the Haymarket Terrace data (Figure 9.2) revealed significant differences at the 1% level on all of the semantic differentials except:-

Distinctive-Ordinary
Has character-Has no character

The comparison of the heavily soiled facade of 84 Haymarket Terrace and the evenly cleaned facade of 74 Haymarket Terrace, reveals large differences in ratings on a number of the semantic differential scales. Large differences are apparent in the ratings of "well looked after", "cheerful", "warm", "soft", "clean", "tidy", "light" and "pleasing colour". These differences are particularly large because of the relatively low rating the soiled facade received on these dimensions.

The relatively low score both facades receive on the dimension of orderliness suggests that this factor might not be heavily influenced by soiling/cleaning. The symmetry of the two facades above ground level possibly accounts for the similar evaluation.

Despite the large difference in the appearance of the two facades which stonecleaning has made, there was no differences in the ratings of character, suggesting, as with orderliness, that this factor may be relatively unaffected by cleaning. Both facades were rated relatively highly on the characteristics of "ordinary", "common", "low status" and "lacking character".

The stonecleaning has tended to result in a decrease in the estimated age of the cleaned facade.

Plate 9.3 84 Haymarket Terrace, Edinburgh.

Plate 9.4 74 Haymarket Terrace, Edinburgh.

Figure 9.2 Comparison of soiled and cleaned buildings in Haymarket Terrace, Edinburgh

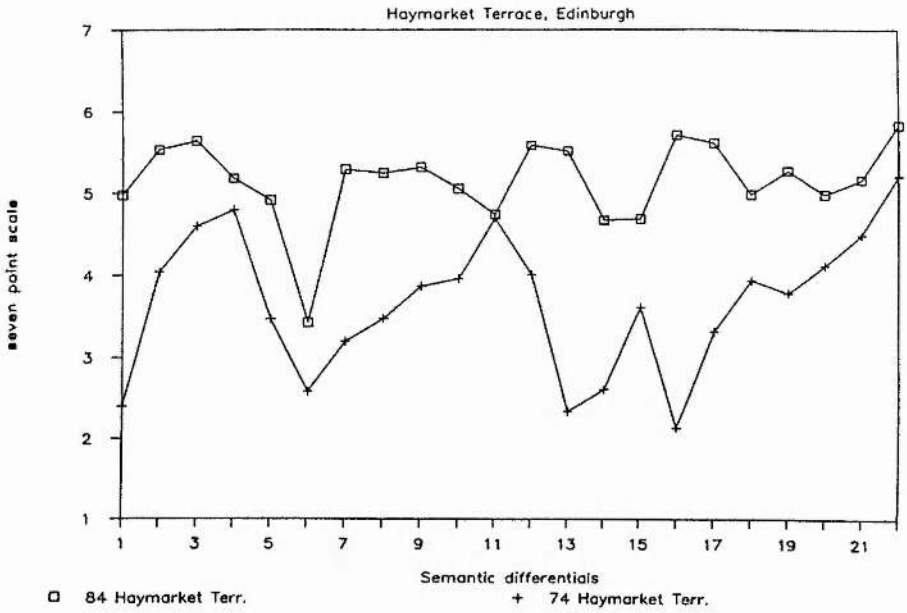


Table 9.2 74/84 Haymarket Terrace, Edinburgh

N=45 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.000**
3.	Delicate						Weighty	0.000**
4.	Distinctive						Ordinary	0.062
5.	Inviting						Repelling	0.000**
6.	Orderly						Irregular	0.006**
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.000**
9.	Attractive						Unattractive	0.000**
10.	Delightful						Dreadful	0.000**
11.	Has character						Has no character	0.578
12.	Soft						Hard	0.000**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.000**
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.000**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.000**
21.	High status						Low status	0.001**
22.	Unique						Common	0.001**

Estimated mean age of buildings
74 Haymarket Terrace 1927 S.D. 38.5
84 Haymarket Terrace 1918 S.D. 33.5

Wilcoxon test P-Value = 0.058

* significant at 5% level
** significant at 1% level

Broughton House, Broughton Road, Edinburgh

(Plates 9.5 & 9.6)

Broughton House and the adjacent building in Broughton Road were selected for study. As the ground floors of the two buildings had dissimilar features, and yet were of the same proportions, the decision was taken to use the lower part of the photograph of Broughton House in both the soiled and cleaned photographs. The ground floor of both buildings are therefore identical on both photographs.

In the composite building, soiling is distributed evenly over the entire facade above the ground floor, although some individual stones have soiled significantly more than others. The windows of this building are not of a uniform type as is the case in the cleaned example. On Broughton House itself the visual effect of cleaning has been variable. On the first and second floors soiling is still very evident on a number of the stones. By comparison the top floor has a very light coloured, even appearance.

Discussion

The results of the Mann Whitney analysis of the Broughton House data (Figure 9.3) revealed significant differences at the 1% level on all of the semantic differentials except those of:-

Delicate-Weighty
Orderly-Irregular
Has character-Has no character
Elegant-Clumsy

While not significant on these dimensions, the cleaned version of the building was rated towards the more positive pole of these semantic differential in each case. The significant differences between the ratings on all of the other semantic differentials is somewhat surprising given the rather striking appearance of the ground floor of the building, which was identical in both cases. It might have been expected that the ground floor would have had a proportionally greater influence on the appraisal of the building, given its appearance. It seems from the results that the cleaning of the upper floors had contributed significantly to the overall evaluation of the building.

Particularly large differences in ratings were made on the dimensions of "well looked after", "distinctive", "cheerful", "tidy", "clean", "light" and "pleasing colour". The cleaning of Broughton House has resulted in a fairly uniform appearance of the stone, with little residual iron staining. The stone has been returned to a reasonable approximation of its natural colour. This seems likely to have had a beneficial effect on its evaluation. The lack of uniformity of the windows in the soiled example may have had some effect on its evaluation.

The cleaned building tended to be seen as younger than its soiled counterpart although the difference was not statistically significant.

Plate 9.5 Broughton House, (composite), Edinburgh.

Plate 9.6 Broughton House, Edinburgh.

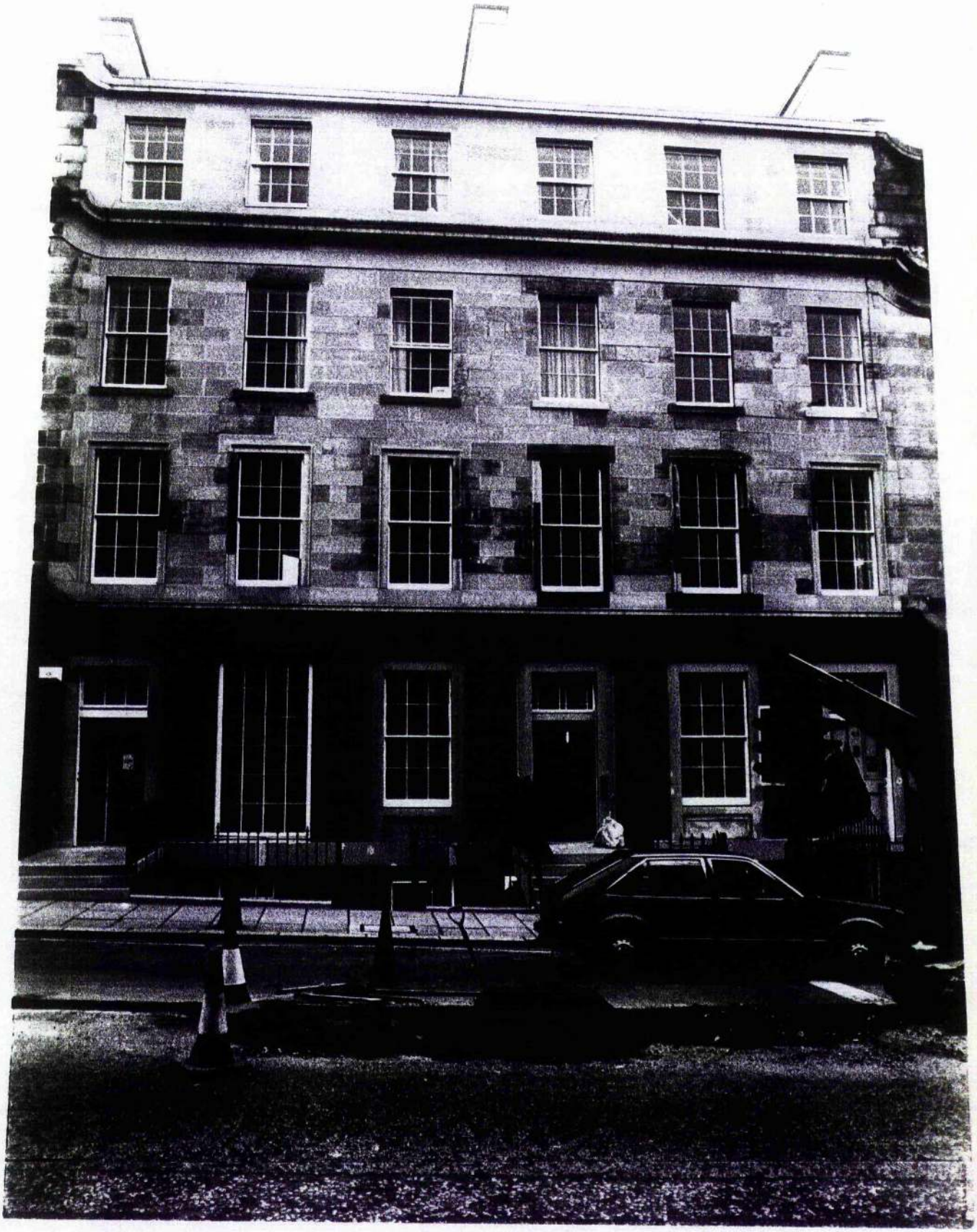


Figure 9.3 Comparison of soiled and cleaned buildings, Broughton House, Edinburgh

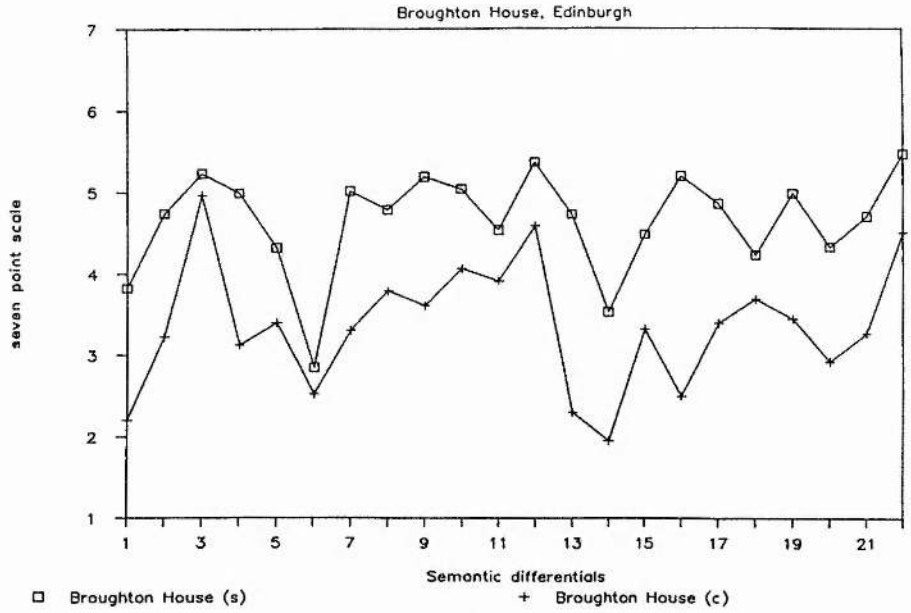


Table 9.3 Broughton House, Broughton Road, Edinburgh

N=80 Analysis:- Minitab. Mann Whitney test.

	1 2 3 4 5 6 7	P-VALUE
1.	Well looked after ..... Shabby	0.000**
2.	Impressive ..... Unimpressive	0.000**
3.	Delicate ..... Weighty	0.737
4.	Distinctive ..... Ordinary	0.000**
5.	Inviting ..... Repelling	0.000**
6.	Orderly ..... Irregular	0.310
7.	Cheerful ..... Gloomy	0.000**
8.	Warm ..... Cold	0.002**
9.	Attractive ..... Unattractive	0.000**
10.	Delightful ..... Dreadful	0.000**
11.	Has character ..... Has no character	0.083
12.	Soft ..... Hard	0.030**
13.	Clean ..... Dirty	0.000**
14.	Tidy ..... Untidy	0.000**
15.	Friendly ..... Unfriendly	0.000**
16.	Light ..... Dark	0.000**
17.	Pleasing colour ..... Displeasing colour	0.000**
18.	Elegant ..... Clumsy	0.065
19.	Uplifting ..... Depressing	0.000**
20.	Dignified ..... Undignified	0.000**
21.	High status ..... Low status	0.000**
22.	Unique ..... Common	0.008**

Estimated mean age of buildings

Broughton House (clean)	1905	S.D. 51.2
Broughton House (soiled)	1889	S.D. 61.5

Mann Whitney test P-Value = 0.312

* significant at 5% level
** significant at 1% level

93-97/99-103 East Claremont Street, Edinburgh

(Plates 9.7 & 9.8)

East Claremont Street is a predominantly residential street near the centre of Edinburgh. The two tenement buildings used in the study are architecturally identical and are adjacent to each other on the street. Both are five storey sandstone buildings with bay windows extending from the ground to the four floor.

The facade of 93-97 East Claremont Street has moderately heavy soiling distributed fairly evenly over their entire facade, although heavier accumulations of soiling are apparent on sills and some lintels, particularly those above two of the windows and doors at ground level. Rainwater run-off has partially cleaned some stones in the centre of the building below the third floor, resulting in a rather patchy appearance.

The facade of 99-103 East Claremont Street has been stonecleaned using a grit blasting technique, leaving the facade a reasonably uniform light honey colour. A few darker orange brown iron stained stones are visible on the facade. Four of the lintels on the ground floor are paler in colour compared to the rest of the facade.

Discussion

The results of the Wilcoxon analysis of the East Claremont Street data (Figure 9.4) revealed significant differences at the 1% level on all of the semantic differentials except:-

Has character-Has no character

While not significant on this dimension, the cleaned building was rated towards the more positive pole of this semantic differential. This pair of buildings revealed striking differences in their evaluation. Particularly large changes were recorded for the dimensions of "well looked after", "cheerful", "clean", "tidy", "light", "warm", "uplifting" and "pleasing colour". This large difference in evaluation can probably be accounted for by the quality of the stonecleaning work.

The cleaned tenement has been left an attractive colour with very little residual staining from either iron migration to the surface of the stone, or water. By comparison, the nature of the soiling on 93-97 East Claremont Street seems to detract from its appearance. The soiled building scores highly on the dimensions of "ordinary", "common", "hard", "weighty" and "displeasing colour". With this being a five storey building, the large area of visibly soiled facade may have contributed to these negative evaluations.

The perception of the age of the building seems also to have been significantly influenced by stonecleaning, the soiled tenement being rated as nearly twenty years older than its cleaned counterpart.

Plate 9.7 93-97 East Claremont St., Edinburgh.

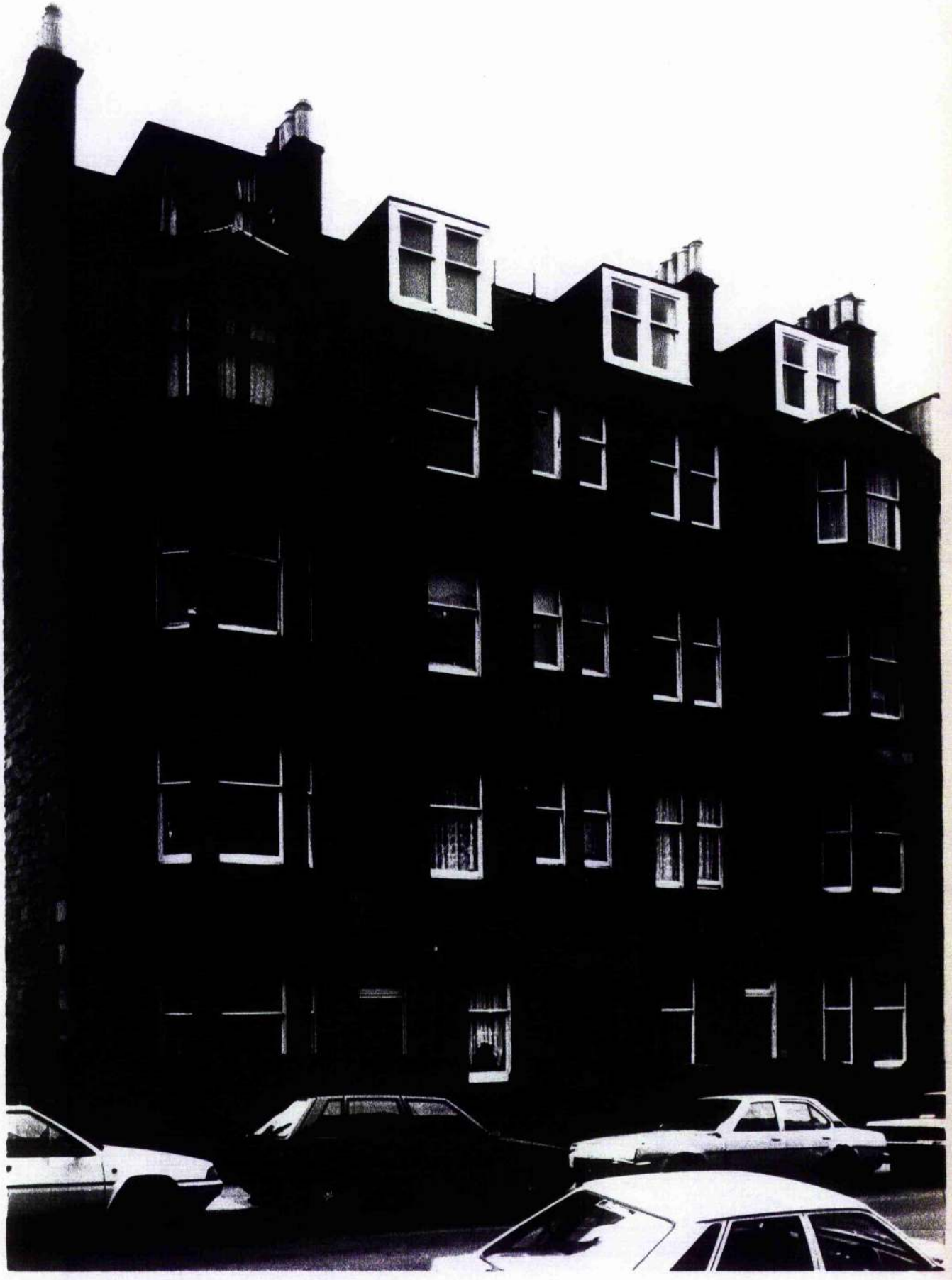


Plate 9.8 99-103 East Claremont St., Edinburgh.

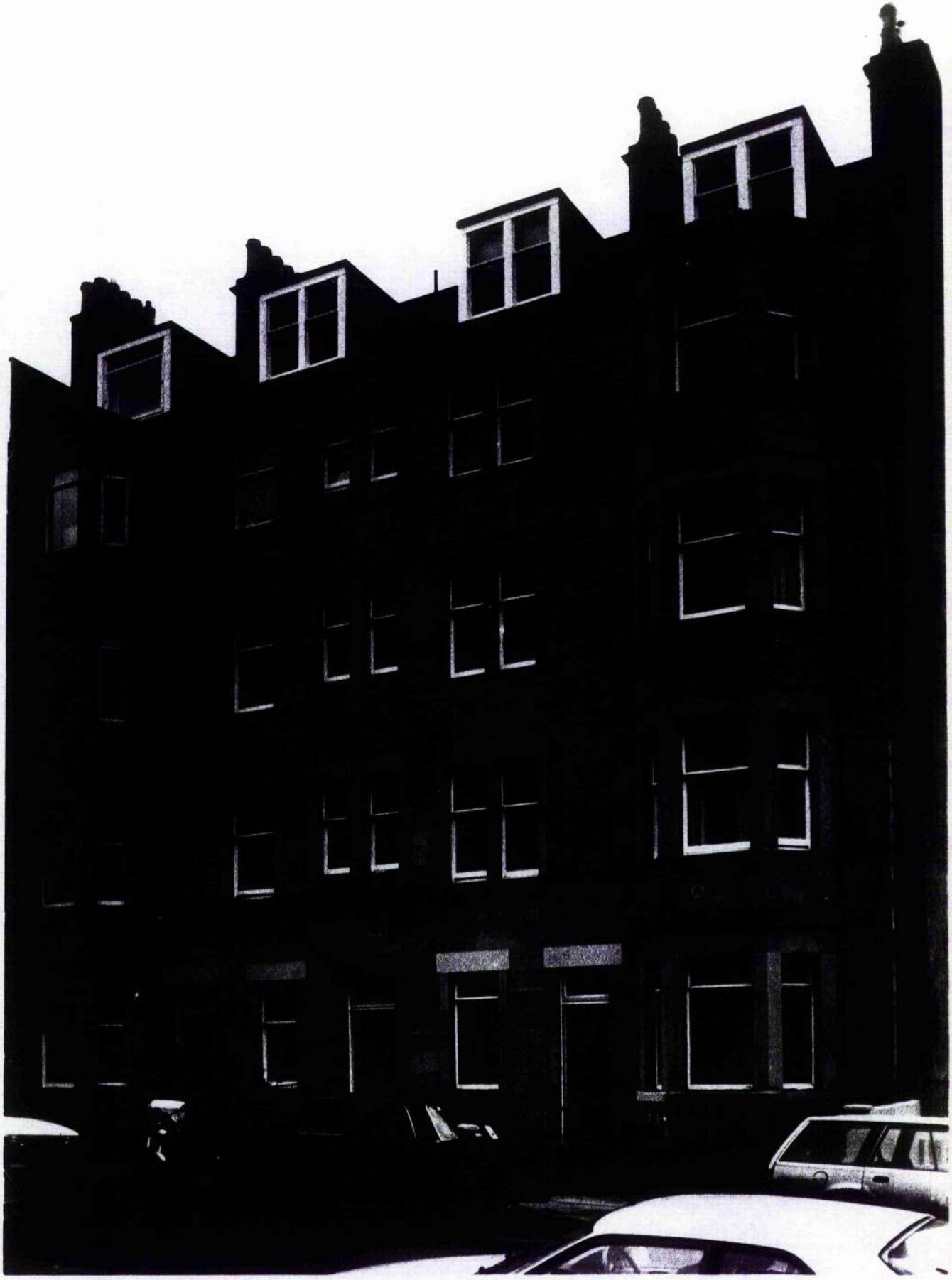


Figure 9.4 Comparison of soiled and cleaned buildings in East Claremont Street, Edinburgh

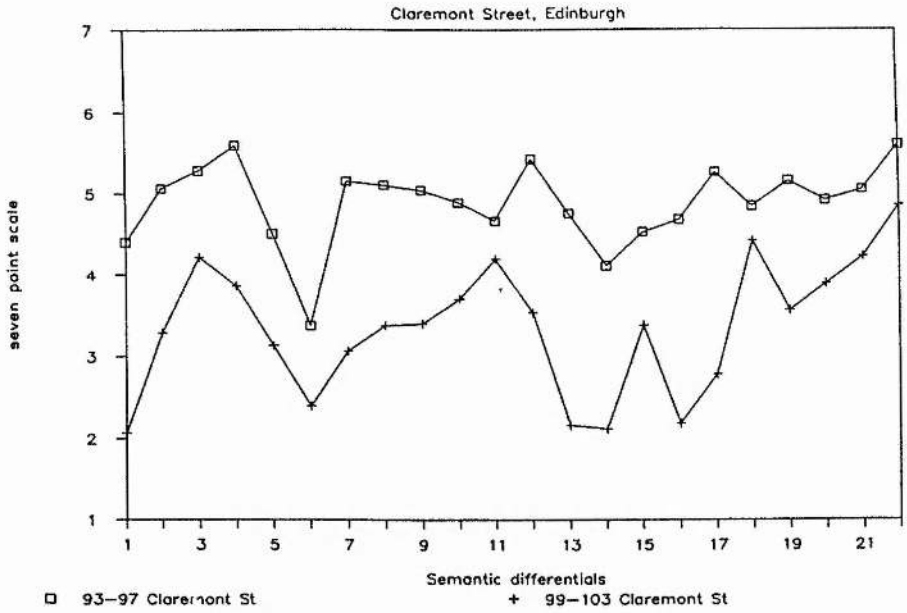


Table 9.4 93-97/99-103 East Claremont Street, Edinburgh

N=45 Analysis:- Minitab. Wilcoxon test.

	1 2 3 4 5 6 7	P-VALUE
1.	Well looked after ..... Shabby	0.000**
2.	Impressive ..... Unimpressive	0.000**
3.	Delicate ..... Weighty	0.000**
4.	Distinctive ..... Ordinary	0.000**
5.	Inviting ..... Repelling	0.000**
6.	Orderly ..... Irregular	0.001**
7.	Cheerful ..... Gloomy	0.000**
8.	Warm ..... Cold	0.000**
9.	Attractive ..... Unattractive	0.000**
10.	Delightful ..... Dreadful	0.000**
11.	Has character ..... Has no character	0.108
12.	Soft ..... Hard	0.000**
13.	Clean ..... Dirty	0.000**
14.	Tidy ..... Untidy	0.000**
15.	Friendly ..... Unfriendly	0.000**
16.	Light ..... Dark	0.000**
17.	Pleasing colour ..... Displeasing colour	0.000**
18.	Elegant ..... Clumsy	0.000**
19.	Uplifting ..... Depressing	0.000**
20.	Dignified ..... Undignified	0.001**
21.	High status ..... Low status	0.002**
22.	Unique ..... Common	0.007**

Estimated mean age of buildings

93-97 East Claremont Street 1917 S.D. 43.4

99-103 East Claremont Street 1936 S.D. 28.9

Wilcoxon test P-Value = 0.025*

* significant at 5% level

** significant at 1% level

23/25 Rutland Street, Edinburgh

(Plates 9.9 & 9.10)

Rutland Street links the west end of Princes Street with Rutland Square in the centre of Edinburgh. Numbers 23 and 25 Rutland Street are sandstone buildings adjacent to each other forming part of a larger terrace. Architecturally they are almost identical.

The facade of 25 Rutland Street is heavily soiled, particularly below the balcony between the first and second floors. Soiling on the ground floor is fairly evenly distributed and is heavier than on the first floor. There is evidence of water staining on some stones below the roofline. The building at 23 Rutland Street has undergone stonecleaning giving a rather bleached appearance to the stonework. Staining is visible below the balcony on the first floor and water marks show along the parapet and above the upper left window. Small repairs have been carried out to the stonework between the lower windows.

Discussion

The results of the Wilcoxon analysis of the Rutland Street data (Figure 9.5) revealed significant differences at the 1% level on all of the semantic differentials except:-

Inviting-Ordinary
Has character-Has no character
Unique-Common

The results of the stonecleaning to 23 Rutland Street has been to leave the building rather bleached which probably accounts for the very large difference in the evaluation of the semantic differentials "light-dark" and "clean-dirty". Interestingly, the mean value of 3.39 for the semantic differential "pleasing colour" compares less favourably than for the building East Claremont Street (2.78) where cleaning has left the sandstone more light brown in colour. Differences between the semantic differentials of "distinctive-ordinary", "orderly-irregular", "unique-common" and "has character-has no character" are relatively small and, as has been suggested before, are perhaps less influenced by soiling than some of the others. Cleaning seems to have brought about relatively large positive changes in the more emotive semantic differentials of "cheerful", "warm", "attractive" and "uplifting".

A significant difference ($P<.01$) was also found in the estimated ages of the buildings. The mean value of the estimated date of 25 Rutland Street being 1885 compared to 1906 for 23 Rutland Street.

Plate 9.9 25 Rutland St., Edinburgh.

Plate 9.10 23 Rutland St., Edinburgh.

Figure 9.5 Comparison of soiled and cleaned buildings in Rutland Street, Edinburgh

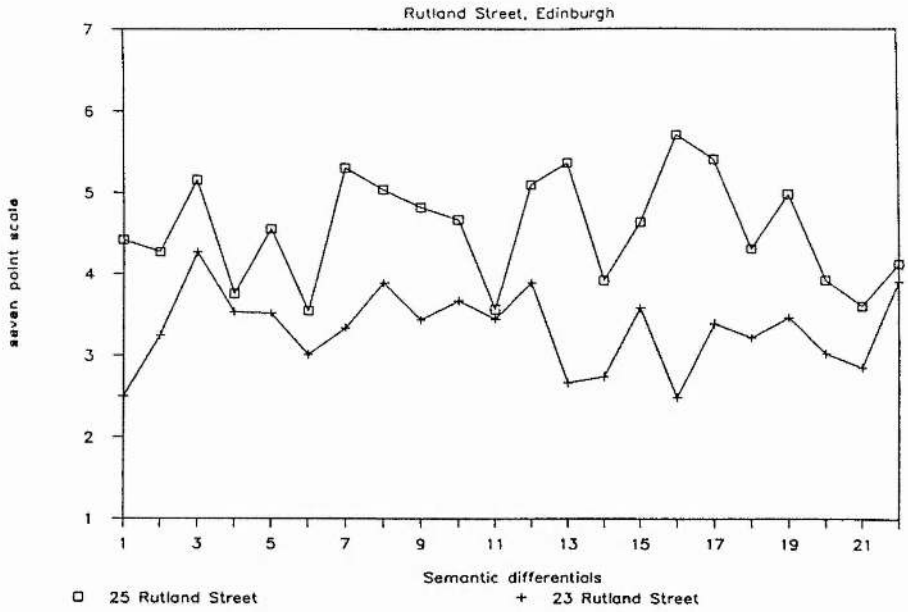


Table 9.5 23/25 Rutland Street, Edinburgh

N=67 Analysis:- Minitab. Wilcoxon test.

	1 2 3 4 5 6 7	P-VALUE
1.	Well looked after ..... Shabby	0.000**
2.	Impressive ..... Unimpressive	0.000**
3.	Delicate ..... Weighty	0.000**
4.	Distinctive ..... Ordinary	0.406
5.	Inviting ..... Repelling	0.000**
6.	Orderly ..... Irregular	0.007**
7.	Cheerful ..... Gloomy	0.000**
8.	Warm ..... Cold	0.000**
9.	Attractive ..... Unattractive	0.000**
10.	Delightful ..... Dreadful	0.001**
11.	Has character ..... Has no character	0.476
12.	Soft ..... Hard	0.000**
13.	Clean ..... Dirty	0.000**
14.	Tidy ..... Untidy	0.000**
15.	Friendly ..... Unfriendly	0.000**
16.	Light ..... Dark	0.000**
17.	Pleasing colour ..... Displeasing colour	0.000**
18.	Elegant ..... Clumsy	0.000**
19.	Uplifting ..... Depressing	0.000**
20.	Dignified ..... Undignified	0.000**
21.	High status ..... Low status	0.000**
22.	Unique ..... Common	0.296

Estimated mean age of buildings

23 Rutland Street	1906	S.D. 32.5
25 Rutland Street	1885	S.D. 35.4

Wilcoxon test P-Value = 0.000**

* significant at 5% level
** significant at 1% level

25/26 Walker Street, Edinburgh

(Plates 9.11 & 9.12)

Walker Street joins Coates Crescent to Melville Crescent in the west end of Edinburgh. Some individual facades on Walker Street have undergone stonecleaning. Numbers 25 and 26, opposite each other on the street, were selected for study as being the most architecturally alike, whilst varying significantly in their level of soiling.

Number 25 is unevenly soiled. Heavy soiling is visible on stonework under the balcony on the first floor and under the ledge of the second floor. Some individual stones between the first and second floor have also become very heavily soiled. By comparison other stones, particularly some on the ground floor, have much lighter soiling.

The cleaning of 26 Walker Street has produced a pale brown coloured facade. Soiling still remains on those parts of the facade which were also heavily soiled on 25 Walker Street, i.e. under the balcony between the ground and first floor, on the ledge between the first and second floors and under the parapet. Some individual stones on the facade have stain marks characteristic of those remaining after cleaning.

Discussion

The results of the Wilcoxon analysis of the Walker Street data (Figure 9.6) revealed significant differences at the 1% or 5% level on all of the semantic differentials except:-

Distinctive-Ordinary
Orderly-Irregular
Delightful-Dreadful
Has character-Has no character
High status-Low status
Unique-Common

While not significant on these dimensions, 26 Walker Street (the cleaned building) was rated towards the more positive pole of these semantic differentials.

The cleaning of 26 Walker Street has resulted in a rather mixed appraisal. While some semantic differentials show marked differences when compared with those of 25 Walker Street, notably "well looked after", "clean", "light" and "tidy", other semantic differentials remain around the mid point of the seven point scale. In particular the ratings of "delicate", "inviting", "warm", "attractive", "delightful" and "soft", while rated more favourably than 25 Walker Street still remained in the mid point range. It may be that the quality of the cleaning in this particular case is poorer than on some of the other sandstone buildings considered in this study (e.g. 99-103 East Claremont Street) although direct comparisons of ratings are not possible because they are different buildings. The residual staining under the balcony, the uneven colour of the stonework and staining on a number of the stones throughout the facade may have contributed to these mid point evaluations.

The estimated mean age of the buildings is almost the same, and represent an underestimation of about 70 years.

Plate 9.11 25 Walker St., Edinburgh.

Plate 9.12 26 Walker St., Edinburgh.

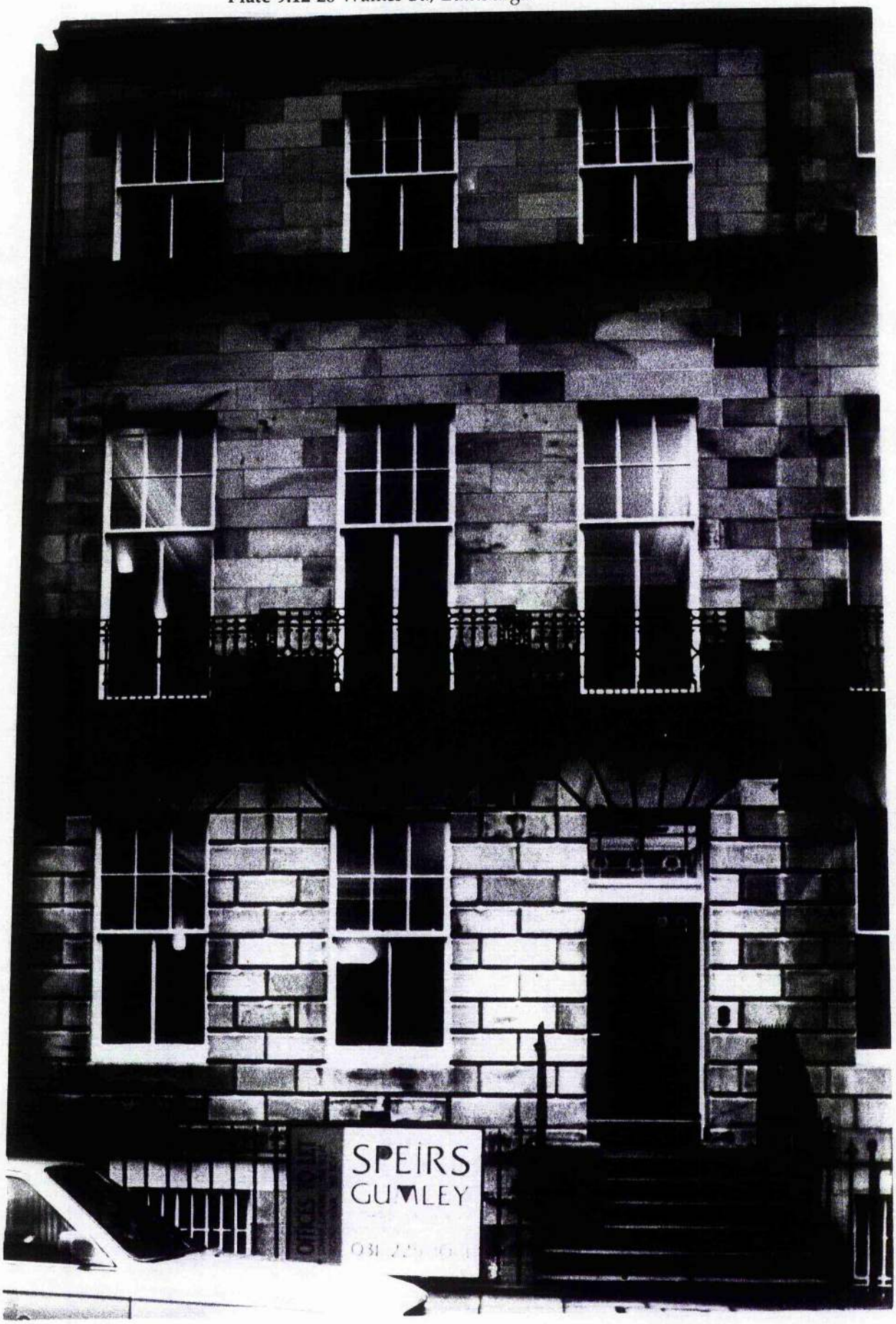


Figure 9.6 Comparison of soiled and cleaned buildings in Walker Street, Edinburgh

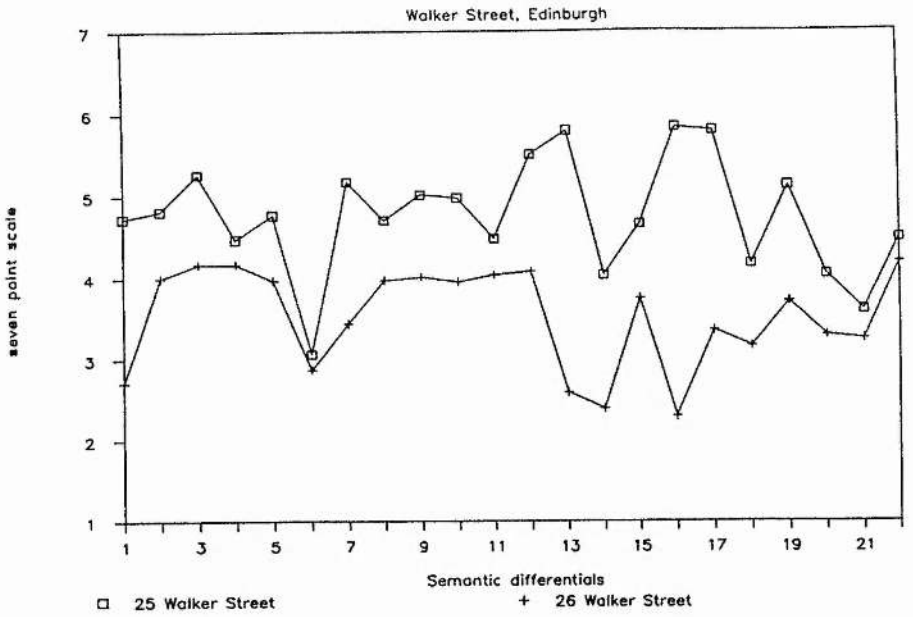


Table 9.6 25/26 Walker Street, Edinburgh

N=45 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.017*
3.	Delicate						Weighty	0.000**
4.	Distinctive						Ordinary	0.472
5.	Inviting						Repelling	0.011*
6.	Orderly						Irregular	0.331
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.032*
9.	Attractive						Unattractive	0.009**
10.	Delightful						Dreadful	0.289
11.	Has character						Has no character	0.201
12.	Soft						Hard	0.000**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.008**
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.000**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.012*
21.	High status						Low status	0.178
22.	Unique						Common	0.268

Estimated mean age of buildings

25 Walker Street	1896	S.D. 48.9
26 Walker Street	1897	S.D. 46.9

Wilcoxon test P-Value = 0.657

* significant at 5% level
** significant at 1% level

58/60 Palmerstone Place, Edinburgh

(Plates 9.13 & 9.14)

Palmerstone Place in central Edinburgh provided the opportunity to study the effects of cleaning on two pairs of buildings in the street (numbers 58/60 and 6/8). Numbers 58 and 60 are adjacent to each other, 58 having undergone stonecleaning while 60, which is architecturally very similar, has not.

The soiling on 60 Palmerstone Place is moderately heavy and reasonably evenly distributed over the entire facade, although the ground floor in the region of the bay window appears slightly less soiled. Soiling on some of the sills is heavier than on the surrounding stonework. Number 60 Palmerstone Place has undergone stonecleaning which has left the facade rather uneven coloured. Orange iron staining is apparent on a number of the stones and there is staining on the bay windows and above the entrance.

Discussion

The results of the analysis of the 58/60 Palmerstone Place data (Figure 9.7) revealed significant differences at the 1% or 5% level on all of the semantic differentials except:-

Delicate-Weighty
Orderly-Irregular
Has character-Has no character

On the dimension of orderliness, 60 Palmerstone Place (the soiled building) scored slightly higher than 58 Palmerstone Place. This was possibly due to the dissimilar

dormer roof windows on 58 Palmerstone Place which were not present on 60 Palmerstone Place. This result, along with the finding of relatively small changes in this dimension on other pairs of buildings in this study, suggests that this dimension is relatively unaffected by cleaning.

Differences between the other semantic differentials tended to be rather small, due mainly to the relatively poor ratings (most around a mean of 4) given to the cleaned building.

The cleaning to 58 Palmerstone Place has produced a patchy facade. The stone has a rather bleached appearance and there is considerable residual staining on the stonework. A comparison can be made between this building and 6 Palmerstone Place, an architecturally similar building also considered in this study. The ratings for 58 Palmerstone Place are consistently below those for 6 Palmerstone Place, suggesting that the nature of the finish produced by cleaning has a significant impact on the evaluation of the facade.

Plate 9.13 60 Palmerstone Place, Edinburgh.

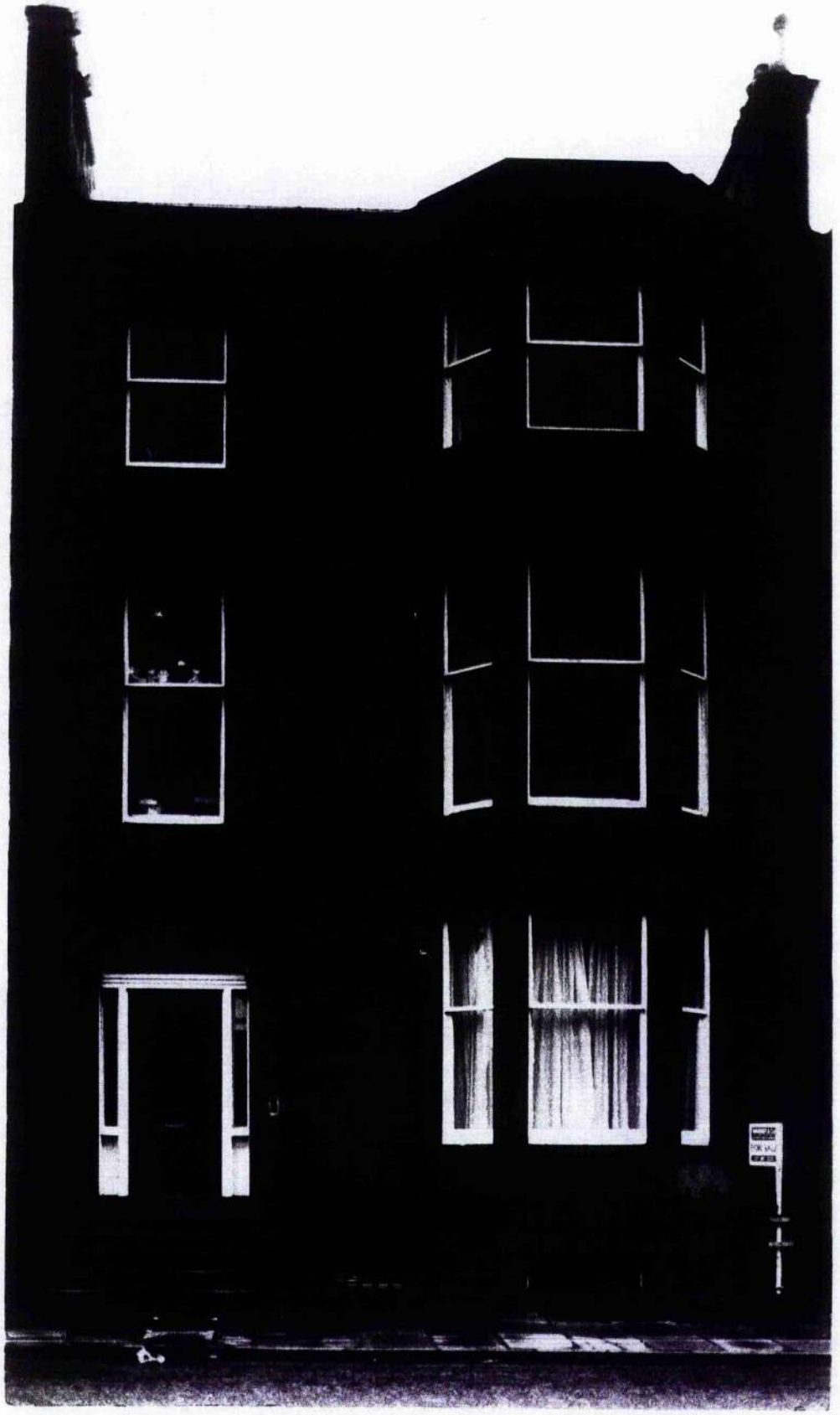


Plate 9.14 58 Palmerstone Place, Edinburgh.

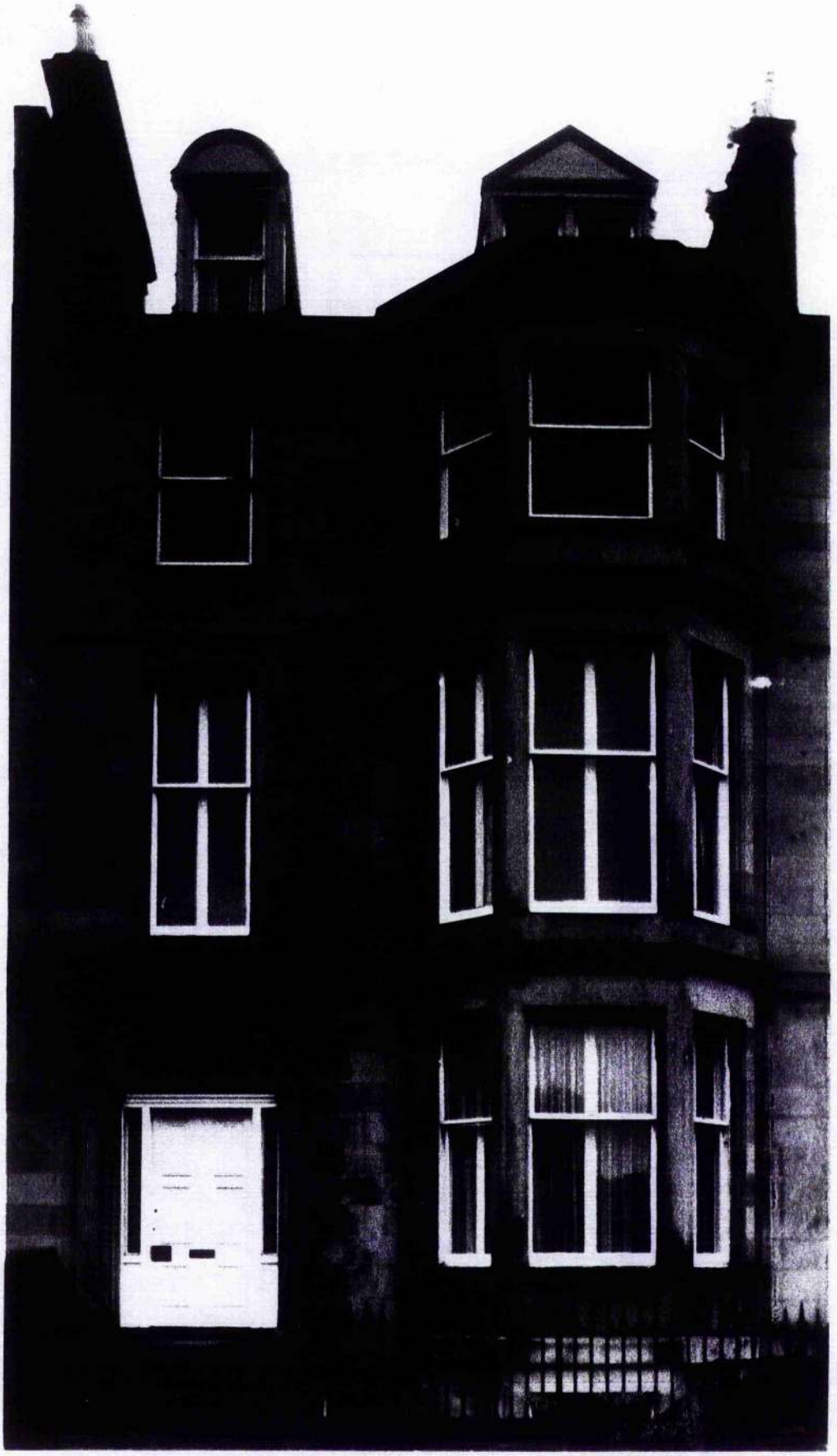


Figure 9.7 Comparison of soiled and cleaned buildings in Palmerstone Place (58 & 60), Edinburgh

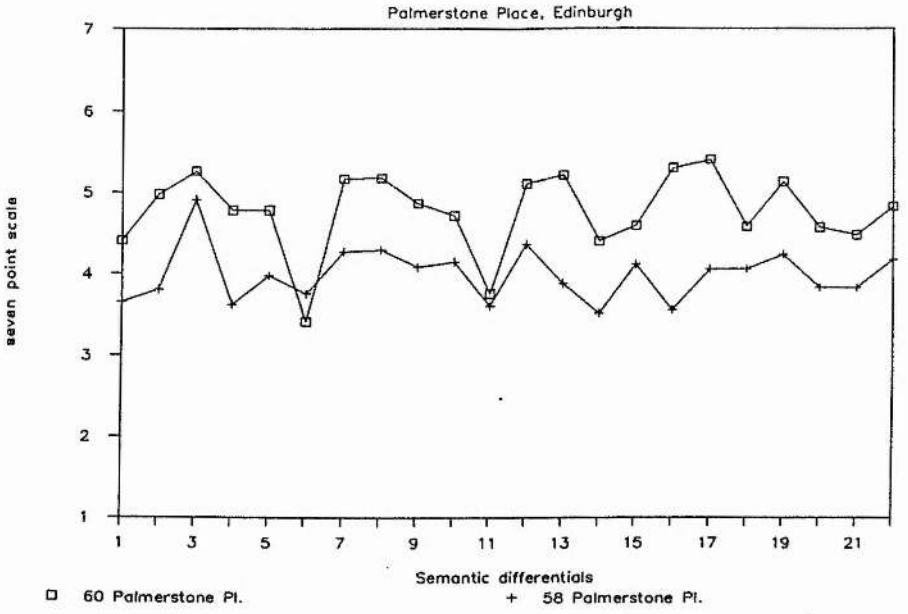


Table 9.7 58/60 Palmerstone Place, Edinburgh

N=46 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.005**
2.	Impressive						Unimpressive	0.000**
3.	Delicate						Weighty	0.068
4.	Distinctive						Ordinary	0.000**
5.	Inviting						Repelling	0.000**
6.	Orderly						Irregular	0.111
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.000**
9.	Attractive						Unattractive	0.001**
10.	Delightful						Dreadful	0.001**
11.	Has character						Has no character	0.446
12.	Soft						Hard	0.001**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.021*
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.020*
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.001**
21.	High status						Low status	0.010**
22.	Unique						Common	0.002**

Estimated mean age of buildings

58 Palmerstone Place	1898	S.D. 31.2
60 Palmerstone Place	1893	S.D. 28.6

Wilcoxon test P-Value = 0.223

* significant at 5% level
** significant at 1% level

6/8 Palmerstone Place, Edinburgh

(Plates 9.15 & 9.16)

The second pair of buildings studied in Palmerstone Place were numbers 6 and 8. The buildings are adjacent to each other on the street and are architecturally identical.

Number 8 Palmerstone Place is heavily soiled over the entire facade, with particularly heavy deposits around the windows and doors. On both side of the bay windows there is evidence of water run-off marks. A large stone below the lower bay window appears at sometime to have been replaced or test cleaned. Number 6 Palmerstone Place has been cleaned leaving the surface a uniform pale grey colour. Some soiling is still evident below the balcony on the bay window and above the door. There is no evidence of any residual staining.

Discussion

The results of the Wilcoxon analysis of the 6/8 Palmerstone Place data (Figure 9.8) revealed significant differences at the 1% level on all of the semantic differentials except :-

Distinctive-Ordinary
Orderly-Irregular
Has character-Has no character
Dignified-Undignified
Unique-Common

The largest differences between the 6 and 8 Palmerstone Place occurred on the semantic differentials of "cheerful", "soft", "clean", "light" and "pleasing colour". The cleaning of 6 Palmerstone Place resulted in an overall uniformly coloured

facade with little visible staining on the stones. This has probably contributed to the scores on the dimensions of "well looked after", "clean" and "tidy". The grey colour of the stonework resulting from the cleaning of 6 Palmerstone Place has produced a valuation for the dimension of "pleasing colour" which is below that of a number of the other cleaned buildings in this study. It would seem that while the grey colour is preferable to the colour of the soiled building, it is less well liked than the pale brown colour achieved in the cleaning of other sandstone buildings.

Plate 9.15 8 Palmerstone Place, Edinburgh

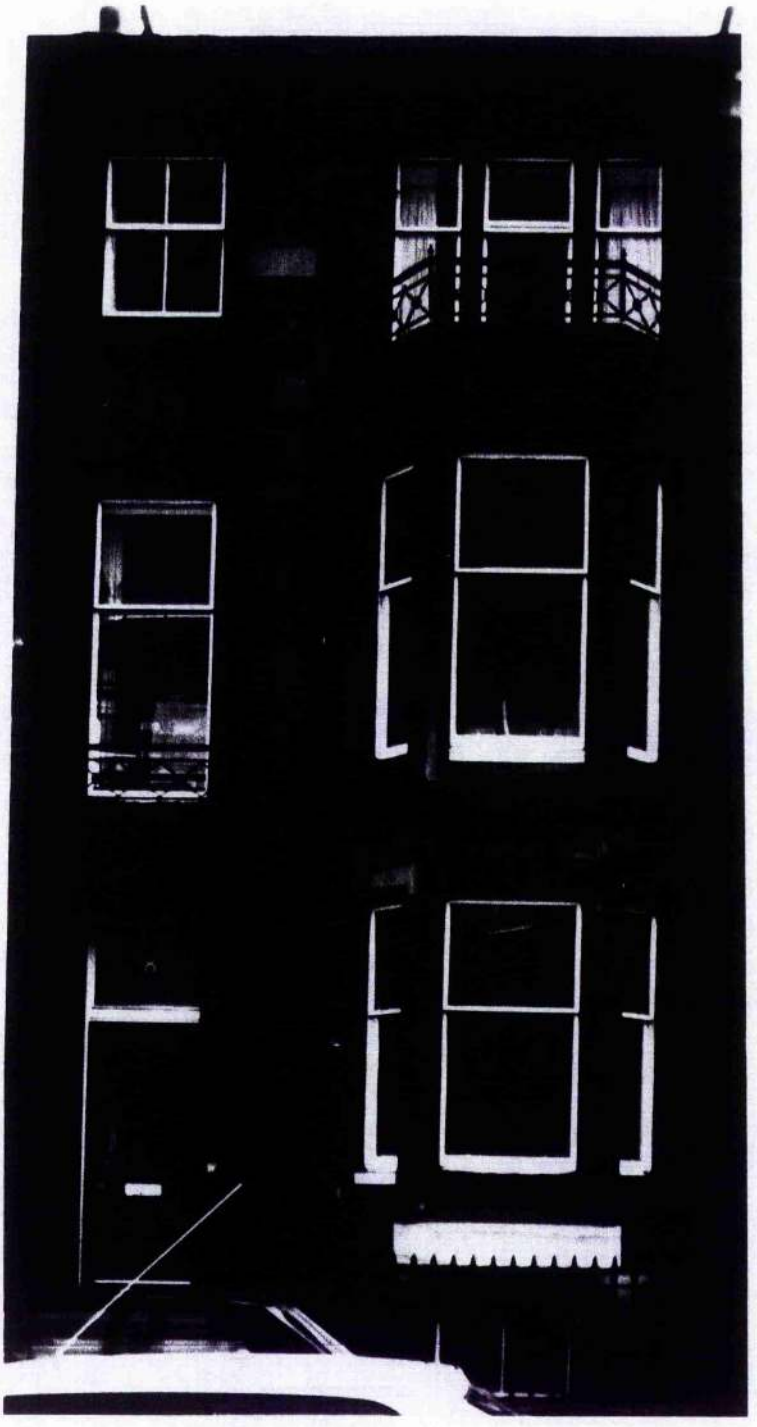


Plate 9.16 6 Palmerstone Place, Edinburgh

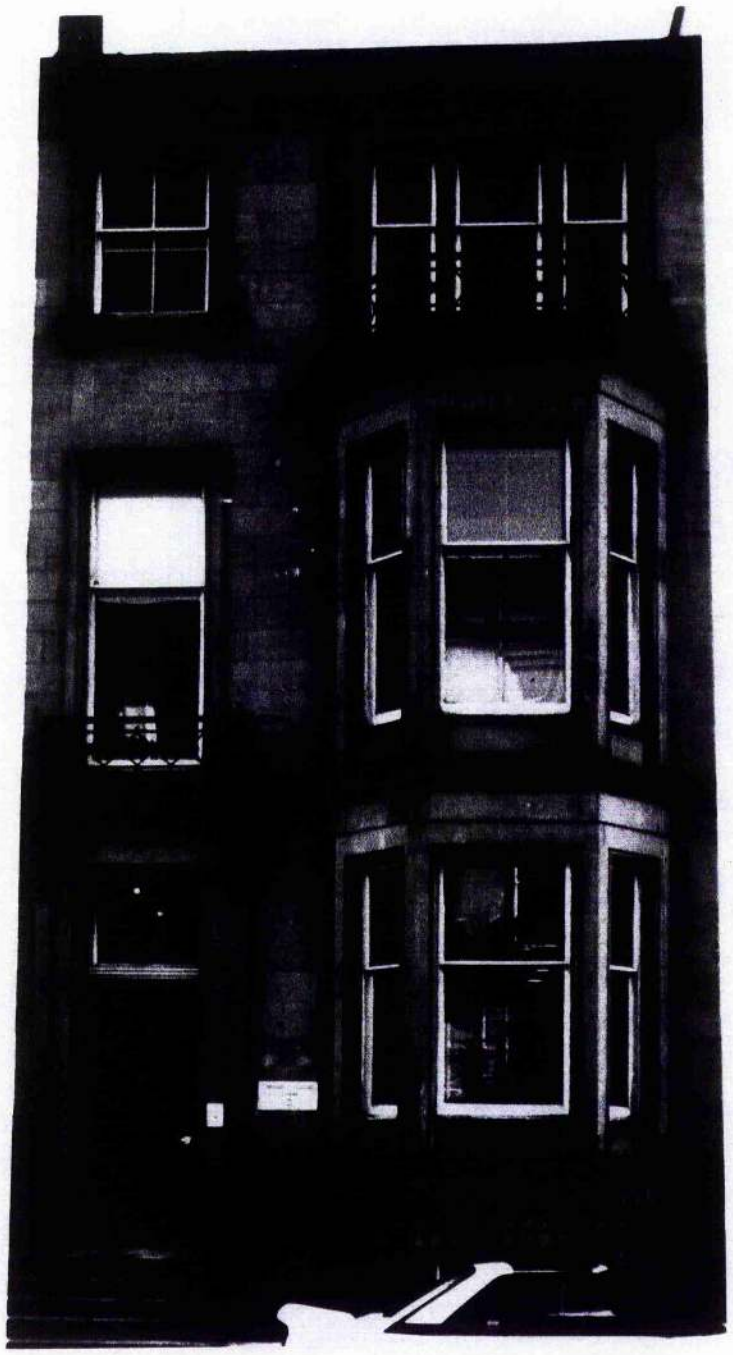


Figure 9.8 Comparison of soiled and cleaned buildings in Palmerstone Place (6 & 8), Edinburgh.

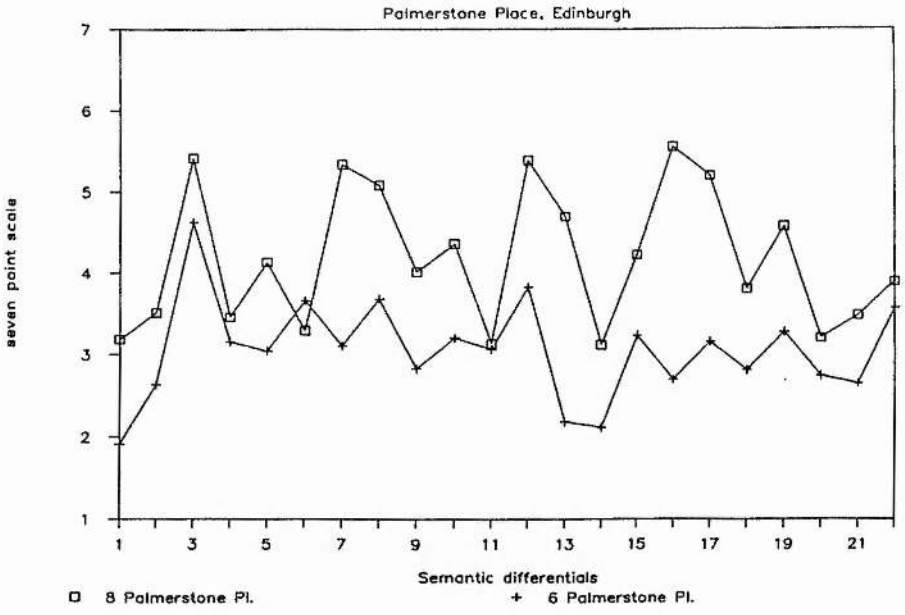


Table 9.8 6/8 Palmerstone Place, Glasgow

N=43 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.006**
3.	Delicate						Weighty	0.001**
4.	Distinctive						Ordinary	0.247
5.	Inviting						Repelling	0.001**
6.	Orderly						Irregular	0.151
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.000**
9.	Attractive						Unattractive	0.002**
10.	Delightful						Dreadful	0.004**
11.	Has character						Has no character	0.864
12.	Soft						Hard	0.000**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.001**
15.	Friendly						Unfriendly	0.001**
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.001**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.100
21.	High status						Low status	0.002**
22.	Unique						Common	0.236

Estimated mean age of buildings

6 Palmerstone Place	1903	S.D. 31.6
8 Palmerstone Place	1903	S.D. 29.8

Wilcoxon test P-Value = 0.262

* significant at 5% level
** significant at 1% level

40/46 Charlotte Square, Edinburgh

(Plates 9.17 & 9.18)

Designed in 1791 by Robert Adam, Charlotte Square is one of the finest squares to be found in Edinburgh. The east side of the square provided the opportunity to study the results of stonecleaning. The facades at either end of the frontage being architecturally identical and yet varying in level of soiling.

Number 40 Charlotte Square is heavily soiled, particularly at ground level and on the carved detailing. Some of the stones at ground floor level have been replaced at some stage and have already begun to darken. Cleaning of number 46 has produced a relatively even pale brown colour, although soiling is apparent on a number of stones below the windows of the ground and second floor. Stones along the parapet blocking course remain heavily soiled and some of the stones on the third floor appear not to have been cleaned to the same level as other parts of the building. The two stone carvings also display some light soiling which has the effect of highlighting the carvings. The carved stone detail on number 40 has been almost totally obscured by soiling.

Discussion

The results of the Wilcoxon analysis of the Charlotte Square data (Figure 9.9) revealed significant differences at the 1% or 5% level on all of the semantic differentials except:-

Orderly-Irregular

Particularly large differences in evaluation were apparent on the semantic differentials of "well looked after", "cheerful", "attractive", "soft", "clean", "tidy", "light", "pleasing colour" and "uplifting", with 46 Charlotte Square (the cleaned building) scoring further towards the positive pole on each of these differentials. Generally, the mean ratings on the semantic differentials for 40 Charlotte Square show a relatively positive evaluation, this despite the presence of a reasonable accumulation of soiling on the facade. It may be that an impressive facade such as 40 Charlotte Square is able to accommodate a large amount of soiling and still be evaluated highly, in a way in which other less impressive facades would not.

Some of the remaining soiling on 46 Charlotte Square is distributed in such a way as to appear consistent with the underlying architecture (e.g. on the carvings) producing a shadowing effect which could be seen to enhance the building's visual appeal. Soiling on 40 Charlotte Square is of such a high level that it obscure such detail.

Although not significant, there was a tendency to judge the cleaned facade as being slightly younger than the soiled facade. The actual date of the buildings are much older than those estimated.

Plate 9.17 40 Charlotte Square, Edinburgh.

Plate 9.18 46 Charlotte Square, Edinburgh.

Figure 9.9 Comparison of soiled and cleaned buildings in Charlotte Square, Edinburgh

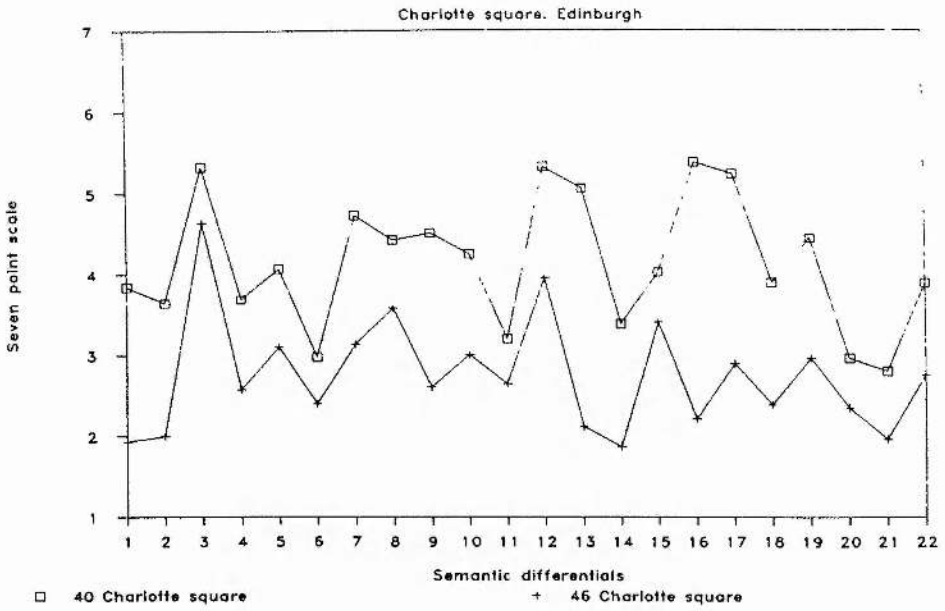


Table 9.9 40/46 Charlotte Square, Edinburgh

N=45 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.000**
3.	Delicate						Weighty	0.026*
4.	Distinctive						Ordinary	0.001**
5.	Inviting						Repelling	0.000**
6.	Orderly						Irregular	0.193
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.006**
9.	Attractive						Unattractive	0.000**
10.	Delightful						Dreadful	0.000**
11.	Has character						Has no character	0.027*
12.	Soft						Hard	0.000**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.014*
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.000**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.001**
21.	High status						Low status	0.000**
22.	Unique						Common	0.000**

Estimated mean age of buildings
46 Charlotte Square 1873 S.D. 58.3
40 Charlotte Square 1858 S.D. 54.8

Wilcoxon test P-Value = 0.109

* significant at 5% level
** significant at 1% level

12-13/14-15 Royal Terrace, Glasgow

(Plates 9.19-9.20)

Royal Terrace, an elegant sandstone terrace on the edge of Kelvingrove Park in Glasgow provided further examples of soiled and cleaned buildings. The buildings selected for study were 12-13 Royal Terrace and the adjacent building 14-15 Royal Terrace, which was architecturally identical.

Numbers 12-13 Royal Terrace represented the soiled example. The soiling pattern on this building was rather uneven. Heavy soiling was apparent over most of the ground floor, but the stonework between the windows, particularly on the upper floor is reasonably clean in parts. The overall effect is one of a patchwork of yellow coloured sandstone with contrasting darker soiled stonework. In addition, there is evidence of algal growth along the eaves and on lintels above the windows on the first floor. This adds a green colour to those parts of the building affected. The porch stonework has been painted and shows relatively little soiling.

Stonecleaning of 14-15 Royal Terrace has resulted in a relatively even, very pale brown coloured building. A large dark brown iron stain is evident to the left of the downpipe under the roofline, and there is also staining around some of the upper windows. The algal growth apparent on 12-13 Royal Terrace is also present on this building in similar locations. The porch has been painted a similar colour as 13-14 Royal Terrace.

Discussion

The results of the analysis from the Royal Terrace data (Figure 9. 10) revealed significant differences at the 1% or 5% level on all of the semantic differentials except:-

Delicate-Weighty
Distinctive-Ordinary
Has character-Has no character
Unique-Common

The change in evaluation following cleaning showed a similar pattern to a number of the other buildings in this study, with relatively large changes in the dimensions of "well looked after", "cheerful", "clean", "tidy", "light" and "pleasing colour". The cleaning of 14/15 Royal Terrace has produced a relatively even colour, except for the heavy iron staining on a number of stones along the eaves. This may well have contributed to the size of the differences in evaluation.

There was also a tendency to view the soiled building as older than the cleaned building, but again the estimated age was later than the actual date of construction.

Plate 9.19 12/13 Royal Terrace, Glasgow.

Plate 9.20 14/15 Royal Terrace, Glasgow.

Figure 9.10 Comparison of scaled and cleaned buildings in Royal Terrace, Glasgow

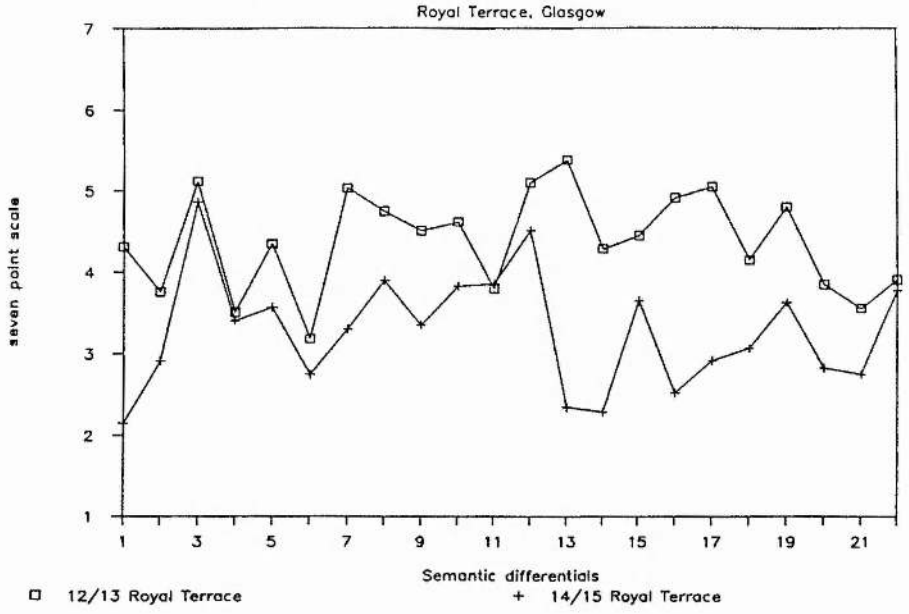


Table 9.10 12-13/14-15 Royal Terrace, Glasgow

N=67 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.001**
3.	Delicate						Weighty	0.155
4.	Distinctive						Ordinary	0.615
5.	Inviting						Repelling	0.001**
6.	Orderly						Irregular	0.017*
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.001**
9.	Attractive						Unattractive	0.000**
10.	Delightful						Dreadful	0.000**
11.	Has character						Has no character	0.909
12.	Soft						Hard	0.006**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.002**
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.000**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.000**
21.	High status						Low status	0.000**
22.	Unique						Common	0.558

Estimated mean age of buildings

12/13 Royal Terrace	1888	S.D. 39.6
14/15 Royal Terrace	1902	S.D. 41.3

Wilcoxon test P-Value = 0.002**

* significant at 5% level
** significant at 1% level

3/4 Magdala Crescent, Edinburgh

(Plates 9.21-9.22)

Magdala Crescent is a residential street in the west end of Edinburgh. Only 3 Magdala Crescent has undergone cleaning, the remainder of the facades in the street retaining their soiled appearance. Number 4 Magdala Crescent the adjacent property, was selected for comparison as architecturally it was the most similar to 3 Magdala Crescent. The soiling on 4 Magdala Crescent was quite heavy and fairly evenly distributed over the entire facade.

Unfortunately, from the point of view of this study, a tree was present in the garden of 4 Magdala Crescent which was not matched by a similar tree in the garden of 3 Magdala Crescent.

The visual result of the cleaning to 3 Magdala Crescent is arguably the worst of all the buildings considered in this study. The stonework has a pale bleached appearance and there is residual staining over large parts of the building. This is particularly evident on stones below the eaves, around the bay windows, on both sides of the doors and on stones adjacent to the ground.

Discussion

The results of the Wilcoxon analysis of the Magdala Crescent data (Figure 9.11) revealed significant differences at the 1% or 5% level on the following semantic differentials:-

Well looked after-Shabby
Impressive-Unimpressive
Distinctive-Ordinary
Cheerful-Gloomy
Warm-Cold
Soft-Hard
Clean-Dirty
Light-Dark
Pleasing colour-Displeasing colour
Uplifting-Depressing

Non significant results were found on the following semantic differentials:-

Delicate-Weighty
Inviting-Repelling
Orderly-Irregular
Attractive-Unattractive
Delightful-Dreadful
Has character-Has no character
Tidy-Untidy
Friendly-Unfriendly
Elegant-Clumsy
Dignified-Undignified
High status-Low status

In general, the two buildings compared in Magdala Crescent showed the least change in semantic differential ratings of all the pairs of buildings studied. Indeed, 4 Magdala Crescent (the soiled building) was rated slightly more negatively on the dimensions of "orderly", "has character", "dignified" and "high status", than 3 Magdala Crescent, although the differences were not significant. It seems likely that the poor visual results achieved by the cleaning of 3 Magdala Crescent have contributed to the smaller shift in semantic differential ratings than those observed in the other sandstone buildings studied.

Cleaning has resulted in a pale bleached facade and there is considerable residual staining on large parts of the facade. Staining is apparent on 4 Magdala Crescent in similar places to 3 Magdala Crescent but is mainly obscured by the soiling. Number

3 Magdala Crescent has been badly cleaning, coupled with this existing staining which was previously obscured by soiling has been revealed by the cleaning process, leaving a largely unattractive facade. None of the semantic differentials scores were below a mean of 3 for either building.

There was a slight tendency to view the cleaned building as slightly younger than its soiled counterpart. Both buildings were dated about 40 years younger than their actual age.

Plate 9.21 4 Magdala Crescent, Edinburgh.

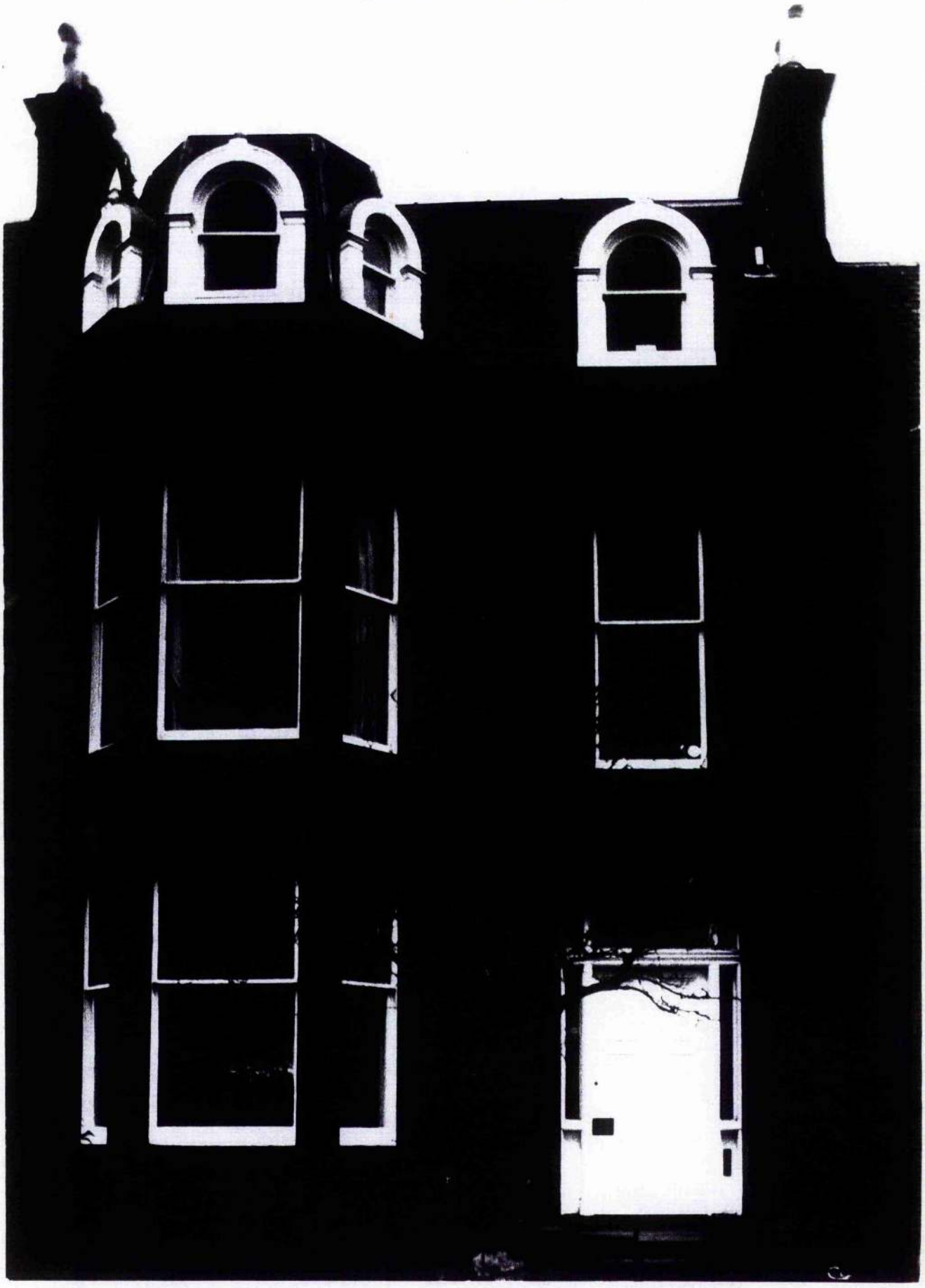


Plate 9.22 3 Magdala Crescent, Edinburgh.

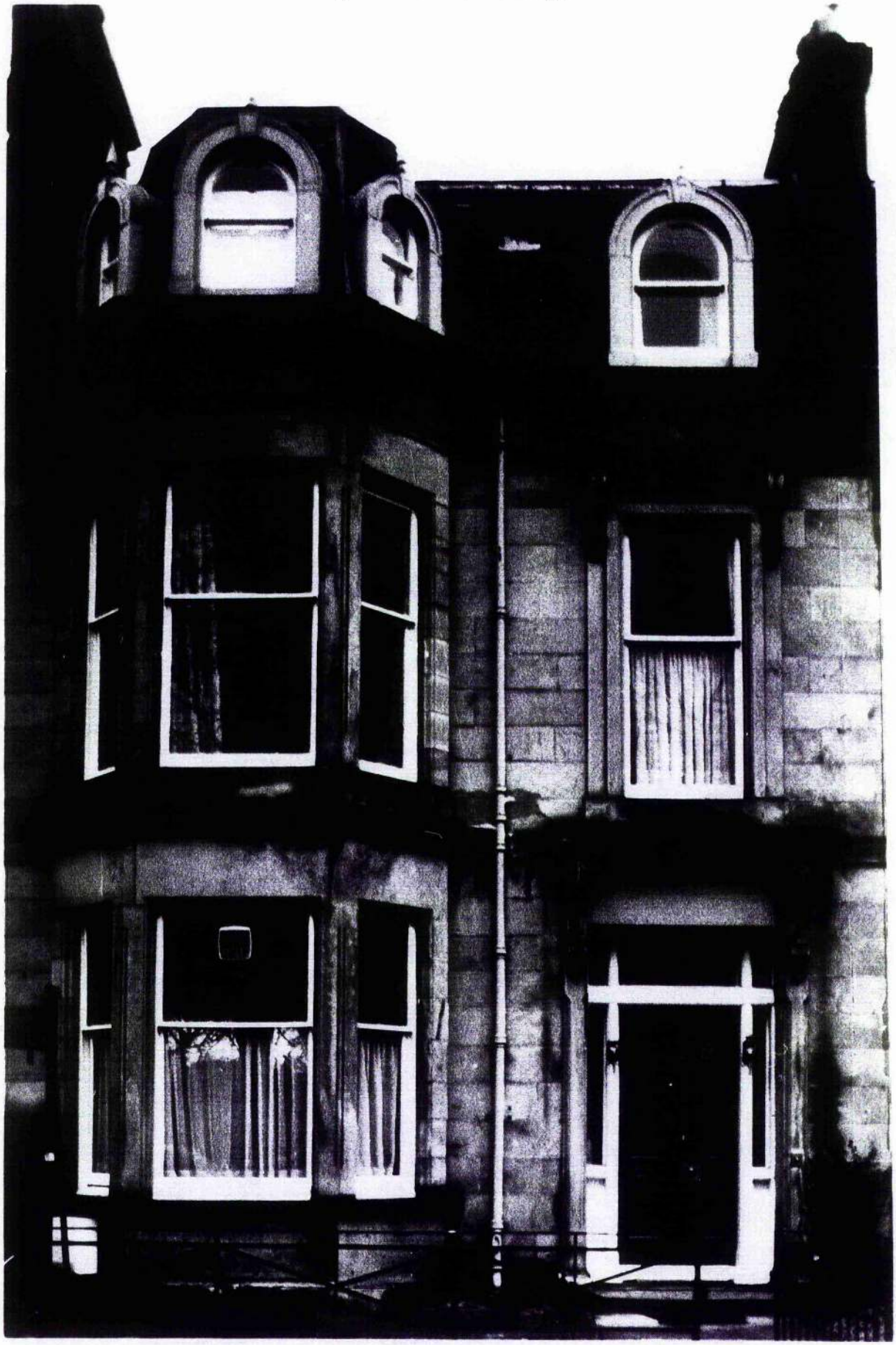


Figure 9.11 Comparison of soiled and cleaned buildings in Magdala Crescent, Edinburgh.

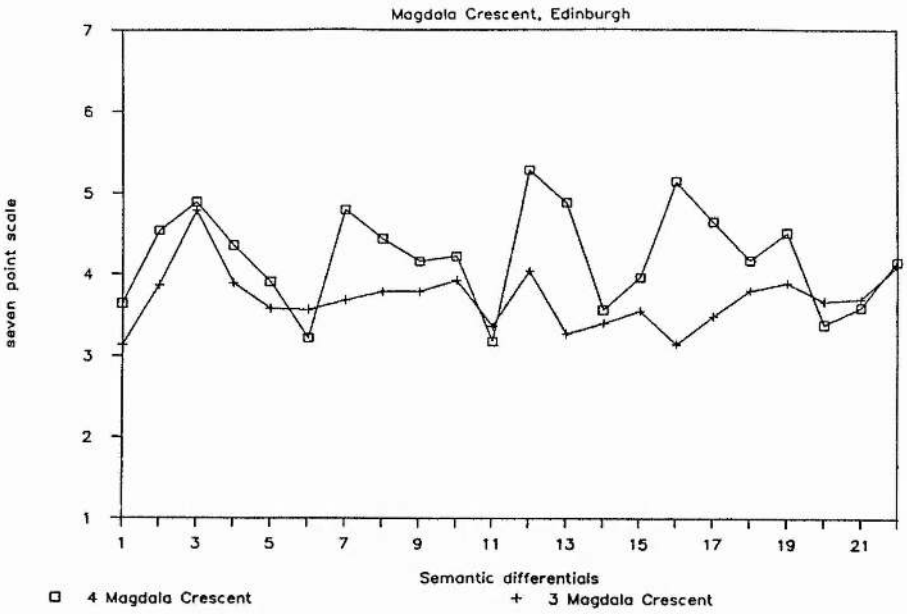


Table 9.11 3/4 Magdala Crescent, Glasgow

N=67 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.024*
2.	Impressive						Unimpressive	0.000**
3.	Delicate						Weighty	0.659
4.	Distinctive						Ordinary	0.026*
5.	Inviting						Repelling	0.200
6.	Orderly						Irregular	0.099
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.004**
9.	Attractive						Unattractive	0.113
10.	Delightful						Dreadful	0.764
11.	Has character						Has no character	0.266
12.	Soft						Hard	0.000**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.515
15.	Friendly						Unfriendly	0.068
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.132
19.	Uplifting						Depressing	0.004**
20.	Dignified						Undignified	0.070
21.	High status						Low status	0.462
22.	Unique						Common	0.739

Estimated mean age of buildings

3 Magdala Crescent	1912	S.D. 27.2
4 Magdala Crescent	1907	S.D. 30.7

Wilcoxon test P-Value = 0.021*

* significant at 5% level
** significant at 1% level

5/7/9 Park Circus Place, Glasgow

(Plates 9.23-9.24-9.25)

Designed by Charles Wilson in 1855-6 and built in 1872-3, Park Circus Place forms an impressive street linking Park Circus with Lynedoch Street in Glasgow. The street not only has examples of identical facades which were either soiled or cleaned, but also had facades cleaned by different methods. It was therefore possible to assess the impact which different cleaning methods had on the perception of the facades.

The three facades selected for study, numbers 5, 7 and 9 formed a row at the Park Circus end of the street. The entire facade of 9 Park Circus Place is heavily soiled. There is evidence of some algal growth particularly under the windows at ground floor level. Number 5 Park Circus Place has undergone stonecleaning which has left the building with a relatively even light appearance, although some individual stones are slightly darker in colour. Number 7 Park Circus Place occupies the position between numbers 5 and 9 in the street and, like number 5, has undergone stonecleaning. Clearly a different method of cleaning has been used as the visual appearance of the facades is very different. Number 7 Park Circus Place has an overall orange-brown appearance usually associated with the presence of iron on the surface, although some stones have retained a much paler appearance. Two stones on the ground floor have clearly been replaced at some stage. The appearance of 7 Park Circus Place is consistent with the results often produced by chemical cleaning, with 5 Park Circus Place appearing to have undergone physical cleaning. Numbers 5 and 7 Park Circus Place serve to show the effects which different cleaning methods can have on identical stone facades.

Discussion

The results of the Wilcoxon analysis of the Park Circus Place data (Figures 9.12) revealed significant differences at the 1% level between 5 and 9 Park Circus Place on all the semantic differentials except:-

Has character-Has no character

Between 7 and 9 Park Circus Place, significant differences at the 1% or 5% level were found on all semantic differentials except:-

Distinctive-Ordinary
Orderly-Irregular
Has character-Has no character
Unique-Common

Between 5 and 7 Park Circus Place significant differences at the 1% or 5% level were found between the following semantic differentials:-

Well looked after-Shabby
Impressive-Unimpressive
Delicate-weighty
Distinctive-Ordinary
Inviting-Repelling
Attractive-Unattractive
Delightful-Dreadful
Clean-Dirty
Tidy-Untidy
Light-Dark
Elegant-Clumsy
Uplifting-Depressing
High status-Low status

Although significant on these dimensions, the differences between the means of the semantic differentials for the two cleaned buildings tended to be much smaller than the difference in the means between 9 Park Circus Place (the soiled facade) and either of the cleaned facades.

The results from these buildings are particularly interesting as they not only allow a comparison to be made between soiled and cleaned facades, but it is also possible to directly compare the results of different cleaning processes. In comparing the soiled facade with the two cleaned facades a similar pattern emerges to that seen in a number of the other pairs of buildings studied. That is there are relatively large differences in semantic differentials such as "well looked after", "cheerful", "clean", "light", "pleasing colour" and "uplifting", whereas the difference in evaluation on scales such as "delicate", "distinctive", "orderly", "character" and "uniqueness" are much smaller.

The differences in evaluation of the semantic differentials of the two cleaned buildings follows an interesting pattern in that the graph for each are of a similar shape, although the absolute values are different. Number 5 Park Circus Place, which has been left an even pale brown colour following cleaning, has tended to be rated more positively than number 7 Park Circus Place, which has been left an orange colour following cleaning. The ratings would suggest a preference for the pale brown colouration. Differences were also apparent in the estimated mean ages of the buildings with 9 Park Circus Place being dated the oldest followed by 5 Park Circus Place and 7 Park Circus Place being seen as the youngest.

Plate 9.23 9 Park Circus Place, Glasgow.

Plate 9.24 7 Park Circus Place, Glasgow.

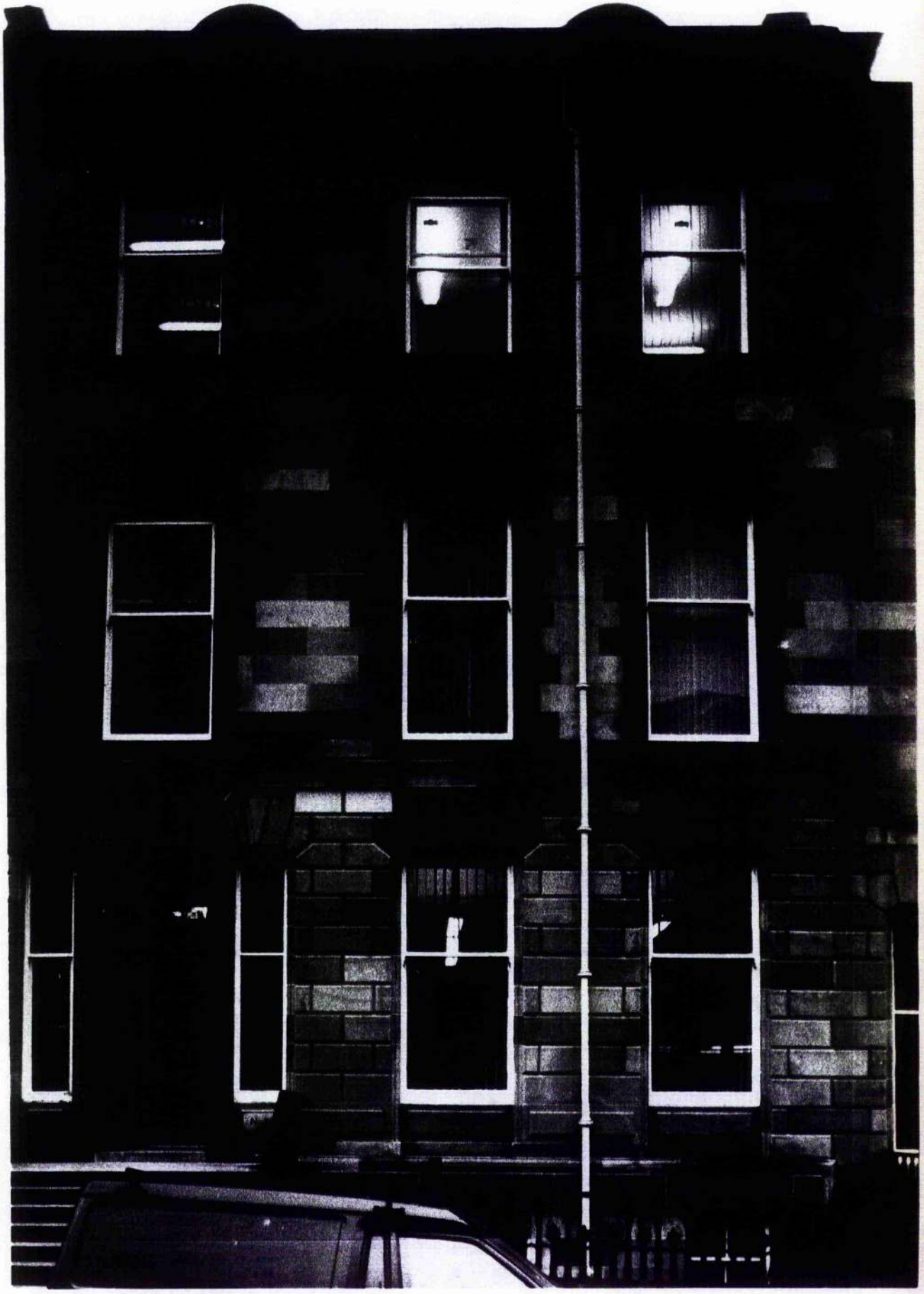


Plate 9.25 5 Park Circus Place, Glasgow.

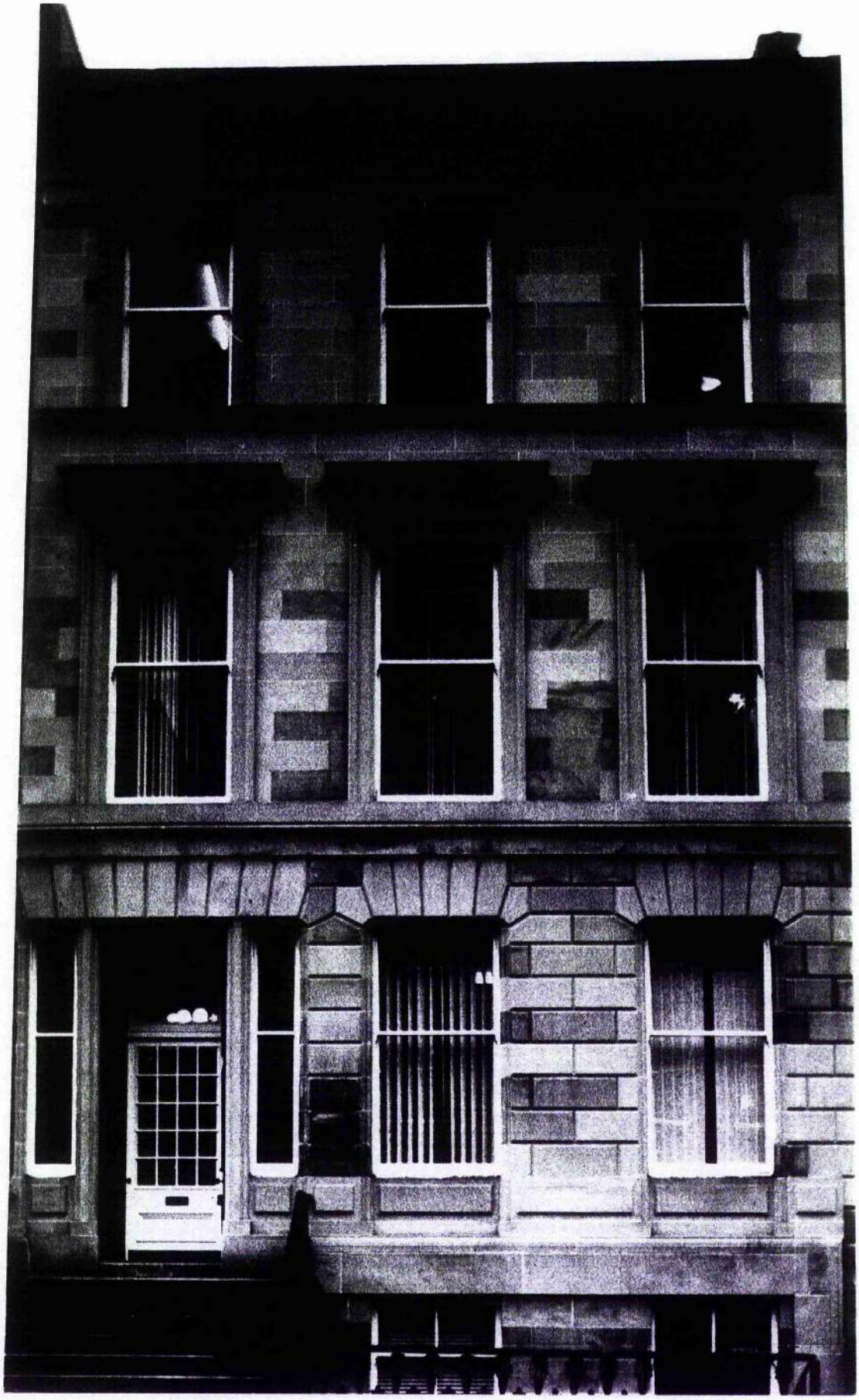


Figure 9.12 Comparison of soiled and cleaned buildings in Park Circus Place, Glasgow

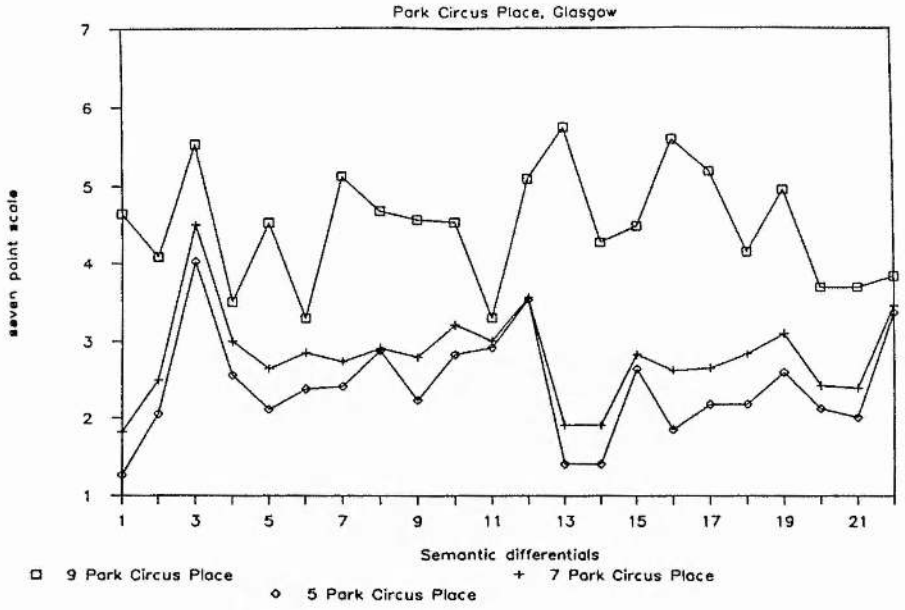


Table 9.12 5/9 Park Circus Place, Glasgow

N=34 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.000**
3.	Delicate						Weighty	0.000**
4.	Distinctive						Ordinary	0.009**
5.	Inviting						Repelling	0.000**
6.	Orderly						Irregular	0.007**
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.000**
9.	Attractive						Unattractive	0.000**
10.	Delightful						Dreadful	0.000**
11.	Has character						Has no character	0.217
12.	Soft						Hard	0.001**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.000**
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.000**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.000**
21.	High status						Low status	0.044*
22.	Unique						Common	0.558

Estimated mean age of buildings
5 Park Circus Place 1891 S.D. 50.9
9 Park Circus Place 1887 S.D. 43.7

Wilcoxon test P-Value = 0.398

* significant at 5% level
** significant at 1% level

Table 9.13 7/9 Park Circus Place, Glasgow

N=34 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.000**
3.	Delicate						Weighty	0.000**
4.	Distinctive						Ordinary	0.184
5.	Inviting						Repelling	0.000**
6.	Orderly						Irregular	0.128
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.000**
9.	Attractive						Unattractive	0.000**
10.	Delightful						Dreadful	0.000**
11.	Has character						Has no character	0.451
12.	Soft						Hard	0.000**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.000**
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.000**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.000**
21.	High status						Low status	0.000**
22.	Unique						Common	0.067

Estimated mean age of buildings
7 Park Circus Place 1911 S.D. 44.5
9 Park Circus Place 1887 S.D. 43.7

Wilcoxon test P-Value = 0.003**

* significant at 5% level
** significant at 1% level

Table 9.14 5/7 Park Circus Place, Glasgow

N=34 Analysis:- Minitab. Wilcoxon test.

	1 2 3 4 5 6 7	P-VALUE
1.	Well looked after ..... Shabby	0.001**
2.	Impressive ..... Unimpressive	0.030*
3.	Delicate ..... Weighty	0.036*
4.	Distinctive ..... Ordinary	0.030*
5.	Inviting ..... Repelling	0.018*
6.	Orderly ..... Irregular	0.061
7.	Cheerful ..... Gloomy	0.092
8.	Warm ..... Cold	0.914
9.	Attractive ..... Unattractive	0.019*
10.	Delightful ..... Dreadful	0.021*
11.	Has character ..... Has no character	0.554
12.	Soft ..... Hard	0.574
13.	Clean ..... Dirty	0.005**
14.	Tidy ..... Untidy	0.002**
15.	Friendly ..... Unfriendly	0.327
16.	Light ..... Dark	0.001**
17.	Pleasing colour ..... Displeasing colour	0.073
18.	Elegant ..... Clumsy	0.005**
19.	Uplifting ..... Depressing	0.015*
20.	Dignified ..... Undignified	0.064
21.	High status ..... Low status	0.045*
22.	Unique ..... Common	0.641

Estimated mean age of buildings
5 Park Circus Place 1891 S.D. 50.9
7 Park Circus Place 1911 S.D. 44.5

Wilcoxon test P-Value = 0.003**

* significant at 5% level
** significant at 1% level

171/173 Great Northern Road, Aberdeen

(Plates 9.26-9.27)

The opportunity to study the perceptual effects of cleaning a granite building were provided by the partial cleaning of a row of tenement flats in the north of Aberdeen. The facade of number 173 Great Northern Road has undergone total renovation, including stonecleaning and the replacement of all windows and door. The facade of number 171 Great Northern Road adjacent to it in the street has undergone none of these changes.

In order to reduce the variance caused by the difference in windows and doors between the two buildings, the windows and doors from a photograph of number 173 were transposed to a photograph of number 171. The soiling on number 171 Great Northern Road, rather than totally obscuring the colour of the stone as in the case of many of the sandstone buildings, appears to have had the effect of darkening the colour of the granite stonework. The colour of the grey and pink granite blocks is clearly visible under the soiling. On number 171 Great Northern Road there is heavy soiling under the guttering, near the downpipe and also below a small iron protrusion on the left of the building. The soiling pattern appears to have followed the path of water down the building. The cleaning of 173 Great Northern Road has left no visible soiling on the facade. Removal of the soiling has lightened the appearance of the granite.

Discussion

The results of the Wilcoxon analysis of the Great Northern Road data (Figure 9.13) revealed significant differences at the 1% or 5% level on all of the semantic differentials except those of:-

Distinctive-Ordinary
Orderly-Irregular
Has Character-Has No Character
Unique-Common

While not significant on these dimensions, 173 Great Northern Road (the cleaned building) was rated towards the more positive pole of these semantic differentials in each case. The largest changes in evaluation between the soiled and cleaned buildings were for the dimensions of "well looked after", "cheerful", "warm", "attractive", "clean", "tidy", "light" and "pleasing colour".

The cleaning of this facade seems to have removed a film of soiling which while not obscuring the underlying colour of the granite stonework, has had the effect of darkening the pink and grey granite stones. Stonecleaning has brought about a shift in evaluation towards a lighter building of more pleasing colour, giving an impression of a better looked after building. Coupled with this have been other positive changes in appraisal.

The large difference between the evaluation of the two buildings might in part be explained by the soiling on number 171 Great Northern Road. Soiling is of a level which clearly masks the colour of the facade, and is attached in a way which is not consistent with any underlying architectural features of the building. Number 173 Great Northern Road by comparison has virtually no visible soiling, and the

cleaning has left no residual staining. The difference in appraisal of the two buildings is thus quite marked.

Plate 9.26 171 Great Northern Rd., Aberdeen.

Plate 9.27 173 Great Northern Rd., Aberdeen.

Figure 9.13 Comparison of soiled and cleaned buildings in Great Northern Road, Aberdeen

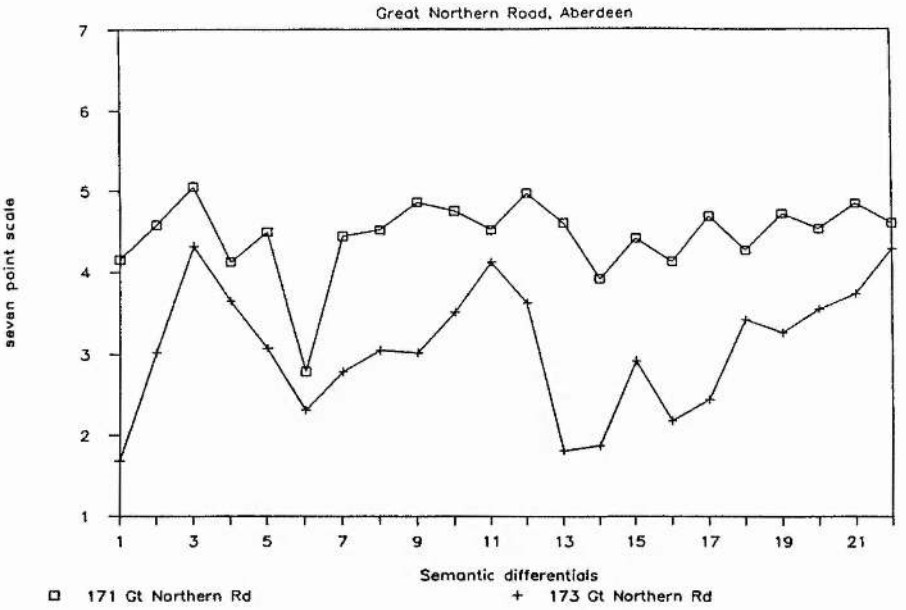


Table 9.15 171/173 Great Northern Road, Aberdeen

N=38 Analysis:- Minitab. Wilcoxon test.

	1	2	3	4	5	6	7	P-VALUE
1.	Well looked after						Shabby	0.000**
2.	Impressive						Unimpressive	0.000**
3.	Delicate						Weighty	0.027*
4.	Distinctive						Ordinary	0.150
5.	Inviting						Repelling	0.000**
6.	Orderly						Irregular	0.076
7.	Cheerful						Gloomy	0.000**
8.	Warm						Cold	0.000**
9.	Attractive						Unattractive	0.000**
10.	Delightful						Dreadful	0.000**
11.	Has character						Has no character	0.236
12.	Soft						Hard	0.000**
13.	Clean						Dirty	0.000**
14.	Tidy						Untidy	0.000**
15.	Friendly						Unfriendly	0.000**
16.	Light						Dark	0.000**
17.	Pleasing colour						Displeasing colour	0.000**
18.	Elegant						Clumsy	0.000**
19.	Uplifting						Depressing	0.000**
20.	Dignified						Undignified	0.000**
21.	High status						Low status	0.000**
22.	Unique						Common	0.247

Estimated mean age of buildings

171 Great Northern Road	1921	S.D. 29.1
173 Great Northern Road	1930	S.D. 36.2

Wilcoxon test P-Value = 0.000**

* significant at 5% level
** significant at 1% level

DISCUSSION

In general the results from the semantic differential evaluations of the pairs of buildings before and after cleaning, revealed quite large changes. In every case the cleaned buildings tended to be rated more positively than the soiled counterparts. The large and significant differences found may in part be due to the examples selected, in that in general very soiled buildings were being compared to relatively recently cleaned ones. Ideally it would have been interesting to have been able to make comparisons of buildings between these extremes. In time many of these recently cleaned buildings will become lightly soiled and this type of analysis will be possible.

The change in evaluation on the various semantic differentials was not however uniform. Figure 9.14 gives the mean percentage change in each semantic differential across all pairs of buildings studied. From this it can be seen that cleaning influences some dimensions more than others. Not surprisingly the dimensions of clean-dirty and light-dark are the most markedly changed. Also, quite large percentage changes occur along the dimensions of pleasing colour, cheerful, tidy and well looked after. To a slightly lesser extent the dimensions of tidy, attractive, impressive, warm, soft, friendly, elegant and uplifting are also improved following cleaning. Least affected by cleaning are the dimensions of orderly, character, unique, impressive and weighty. It would seem that these characteristics are probably more influenced by the architecture of the building rather than the level of soiling.

The question of possible changes to the character of buildings is interesting as this is sometimes cited as a reason for not cleaning buildings. The concept of character is often used in connection with buildings but is rarely defined. It might be that character needs to be considered on a larger scale than the facades studied here, perhaps at street or neighbourhood scale. It would also seem likely that the concept of character develops over time with repeated exposure to buildings. The responses of individuals seeing a building for the first time, as was the case in this study, may be different to those who are more familiar with soiled buildings.

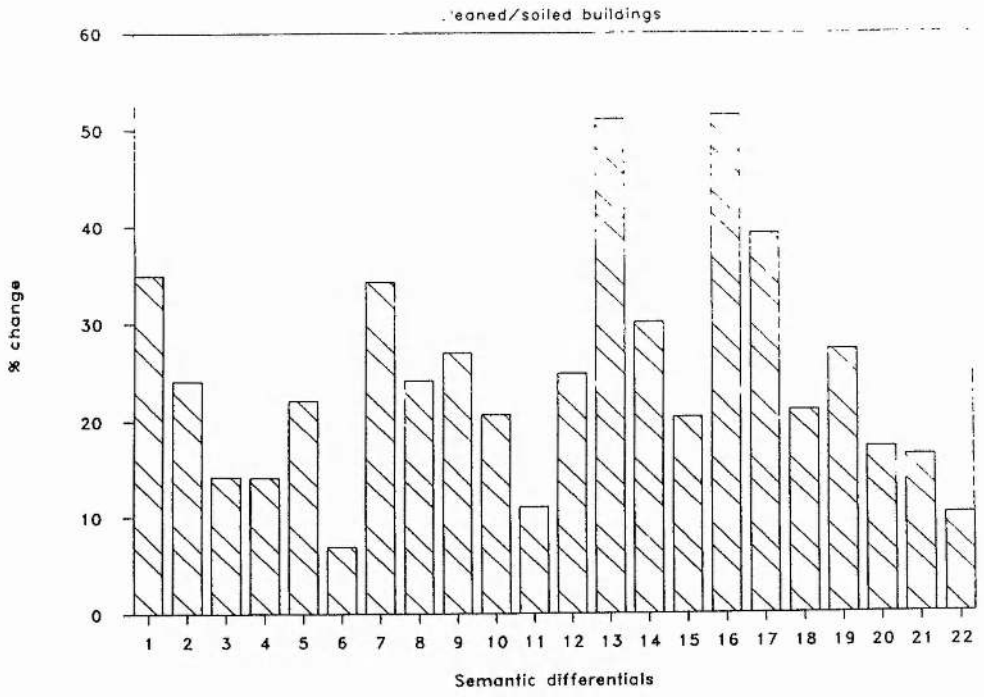
While it is difficult to make direct comparisons between the various cleaned buildings used in this study, some comparisons are possible. Figure 9.15 represents the evaluation of six different cleaned buildings. The evaluation for the semantic differential of "pleasing colour-displeasing colour" varies for each building. The most pleasing colour being for the evenly coloured yellow/brown facade of 5 Park Circus Place followed by the slightly darker brown coloured facade of the East Claremont Street tenement. The uniformly coloured but rather bland pale facades of 6 Palmerstone Place and 23 Rutland Street were preferred next, with the heavily stained facades of 4 Magdala Crescent and 58 Palmerstone Place liked least. It is also interesting to note that the dimensions of "warm-cold" and "well looked after-shabby" follow a very similar pattern. What seems to emerge from these results is that stonecleaning produces a positive change in evaluation, but that the extent of the change in evaluation is very much dependent on the quality of the finish produced by the stonecleaning process.

Subjects in this study were also asked to make estimations of the age of buildings. Table 9.16 and Figure 9.16 gives a summary of the results of these estimations and

compares them with the actual age of the buildings, where it has been possible to determine this. There was a general tendency to estimate the age of the cleaned buildings as being slightly younger than their soiled counterparts (no soiled building was estimated as being younger than its cleaned counterpart). In most cases the differences were not large, although there was considerable individual variance on this task.

It may be that the architectural style was the main influence in judging the approximate period of the building, but stonecleaning had the effect shifting estimations to the later part of the period. Where it was possible to actually date the building, it was found that there was a general tendency to underestimate the age of buildings. With this general tendency to underestimate combined with the effect of stonecleaning on estimation, large scale stonecleaning might reduce the sense of age of individual buildings or urban areas.

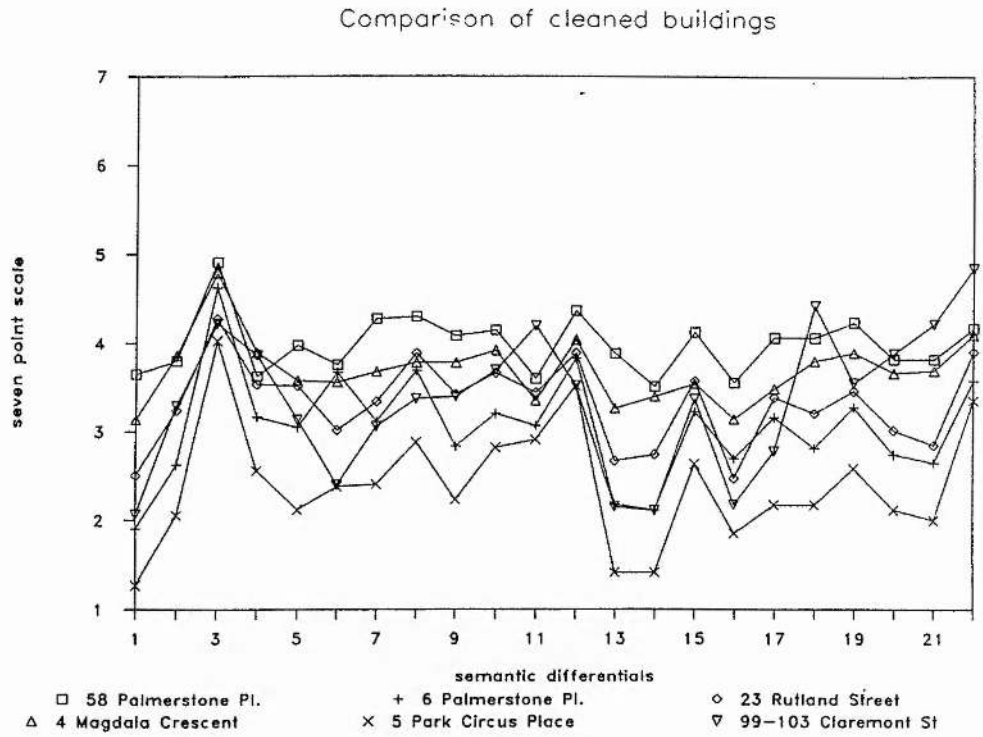
Figure 9.14 Mean percentage change in each semantic differential for all the buildings studied.



Semantic differentials

1. Well looked after.....Shabby
2. Impressive.....Unimpressive
3. Delicate.....Weighty
4. Distinctive.....Ordinary
5. Inviting.....Repelling
6. Orderly.....Irregular
7. Cheerful.....Gloomy
8. Warm.....Cold
9. Attractive.....Unattractive
10. Delightful.....Dreadful
11. Has character.....Has no character
12. Soft.....Hard
13. Clean.....Dirty
14. Tidy.....Untidy
15. Friendly.....Unfriendly
16. Light.....Dark
17. Pleasing colour.....Displeasing colour
18. Elegant.....Clumsy
19. Uplifting.....Depressing
20. Dignified.....Undignified
21. High status.....Low status
22. Unique.....Common

Figure 9.15 Semantic differential ratings for six cleaned buildings



Semantic differentials

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21. High status ..... Low status
22. Unique ..... Common

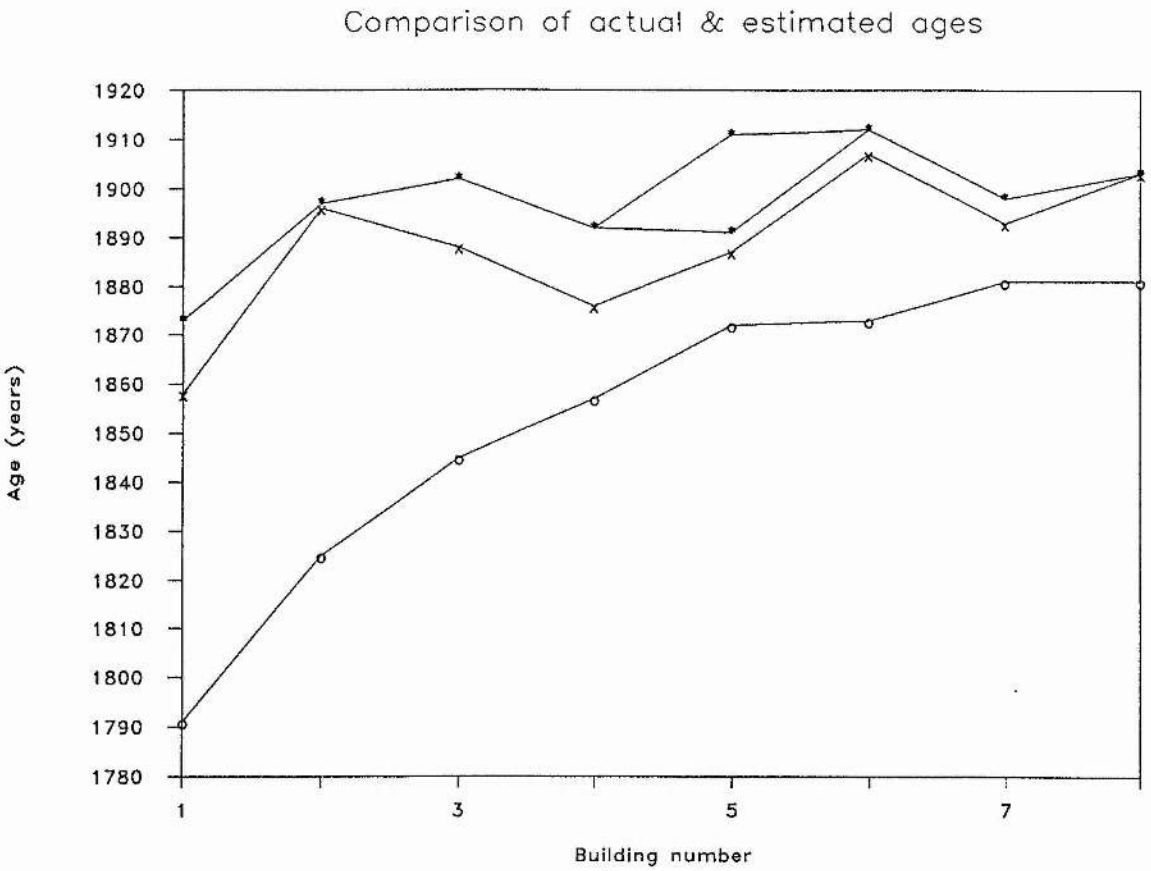


Figure 9.16 Graph comparing estimated age of soiled and cleaned buildings with their actual age.

o - actual age, x - estimated age (soiled), * - estimated age (cleaned)

Table 9.16 Estmated building ages

Location	Actual age	Estimated age (soiled)	error (years)	Estimated age (cleaned)	error (years)
1. Charlotte Sq.	1791	1858	-67	1873	-82
2. Walker St.	1825	1896	-71	1897	-72
3. Royal Terr.	1845	1888	-43	1902	-57
4. La Belle Pl.	1857	1876	-19	1892	-35
5. Park Circus	1872	1887	-15	1891 1911	-19 -39
6. Magdala Cres.	1873	1907	-34	1912	-39
7. Palmerstone (58 & 60)	1881	1893	-12	1898	-17
8. Palmerstone (6 & 8)	1881	1903	-22	1903	-22

Chapter Ten (part 1)

Residents survey :- Edinburgh and Glasgow

INTRODUCTION

The photographic study of the appraisal of buildings before and after cleaning (Chapter 9) gave the opportunity to study the effects of cleaning on individual buildings. However, much of the stonecleaning which takes place involves groups of buildings (e.g. terraces). In order to evaluate the aesthetic questions involved in this aspect of stonecleaning it was thought useful to conduct appraisals of terraces on site. In this situation the buildings could be viewed and evaluated as they actually were rather than using photographic representations of the buildings. Using photographs of whole terraces results in a small image and loss of detail on those parts of the terrace furthest away from the camera (a problem which didn't exist when individual buildings were photographed). Three examples of terraces which varied in terms of soiling and cleaning characteristics, were selected for study. These were:-

1. 22-29 Park Circus, Glasgow

This is a terrace of houses designed by Charles Wilson and James Boucher built around 1861-3. The terrace has been cleaned as a single unit (Plate 10.1). This terrace represents a grouping of facades which have undergone a complete exterior stonecleaning programme at the same point in time. The result of this cleaning has been to leave the terrace an even light brown colour.

2. 15-21 Park Circus, Glasgow

Numbers 15-21 Park Circus Place are a row of terrace houses designed by Charles Wilson and build about the same time as numbers 22-29 Park Circus. Together these two terraces form the half of Park Circus in Glasgow. The circus is completed on the north east side by an oval shaped single terrace of houses. Numbers 15-21 Park Circus are architecturally almost identical to numbers 22-29 Park Circus, but whereas numbers 22-29 have been cleaned as a single unit, numbers 15-21 have undergone partial cleaning (Plate 10.2). One end of the terrace remains heavily soiled, the rest of the terrace has been cleaned, but individual houses have been cleaned at different times, resulting in sections of the cleaned area of the terrace being different shades of brown. In total five distinct vertical bands of colours are discernible on the terrace. This terrace was selected as it represented a fairly typical example of the effects of partial cleaning, and could be directly compared to a terrace which had undergone cleaning as a complete unit.

3. Randolph Crescent, Edinburgh

This crescent consists of a semicircle of three and four storey houses in the centre of Edinburgh built in the 1820's. Randolph Crescent is part of the New Town area of Edinburgh where a policy of non-cleaning is in operation. Soiling is evident over the entire crescent. The soiling is moderately heavy, but evenly distributed over the entire facade (Plate 10.3). The crescent was selected as an example of a group of buildings broadly similar in architectural style, shape and size to the two terraces at Park Circus. but with no history of stonecleaning activity.

The three terraces of broadly similar ages and architectural style are characteristic of different patterns of soiling and cleaning found in urban

streetscapes, and gave the opportunity to study the effects of different stonecleaning regimes.

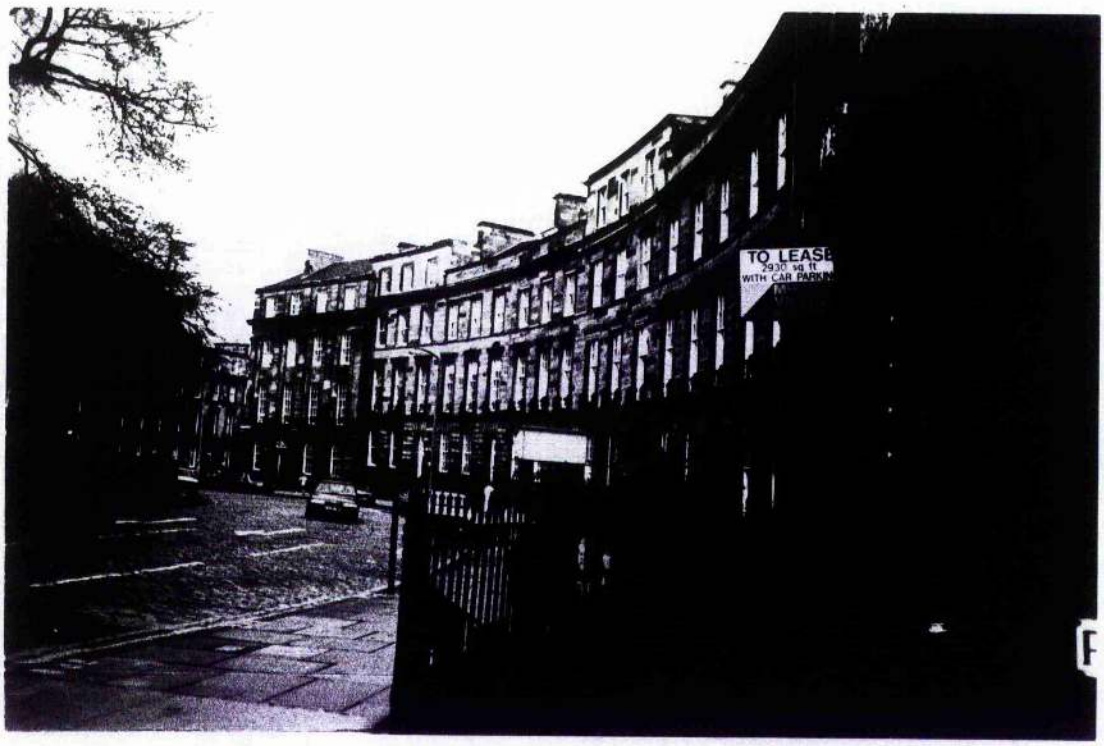
On site appraisals also gave the opportunity to gather information from individuals within both Glasgow and Edinburgh about their attitude to various aspects of stonecleaning.

The aim of the on site surveys was thus twofold. Firstly, to compare evaluations of three terraces which varied in terms of the pattern of soiling and cleaning present on their facades. Secondly, to gather information about the knowledge and attitudes to stonecleaning from as large a cross section of inhabitants of two cities (Edinburgh and Glasgow) which had undergone extensive stonecleaning programmes in recent years.

Plate 10.1 22-29 Park Circus, Glasgow.

Plate 10.2 15-21 Park Circus, Glasgow.

Plate 10.3 Randolf Crescent, Edinburgh.



METHOD

An opportune sample of inhabitants of Glasgow and Edinburgh were stopped in the street (in approximately the same place as the photographs were taken) where a clear view of one of the selected terrace was available. Subjects were asked if they would be prepared to answer a few questions for research purposes about buildings in the city. Perhaps because the three terraces were situated a little way from the city centres and thus not a usual place to find market researchers, refusal rates tended to be fairly low, particularly if individuals were prepared to wait long enough to find out that the purpose of the research was about their views of buildings.

If subjects agreed to be questioned they were asked to look at the appropriate terrace. After doing so they were then informed that they would be required to make an overall judgment of the terrace on a number of seven point scales. The semantic differential was then explained to them, i.e. a rating of 1 or 7 would represent the extremes on the scales with the score of 4 being the mid point. Scores of 2/3 and 5/6 being progressively further towards the extremes. As this was being asked of people being stopped in the streets a decision was made to restrict the number of semantic differentials to eight which were selected as being the most appropriate for this particular study. The semantic differentials used were:-

1. Well looked after.....Shabby
2. Cheerful.....Gloomy
3. Attractive.....Unattractive
4. Has character.....Has no character
5. Clean.....Dirty
6. Tidy.....Untidy
7. Pleasing colour.....Displeasing colour
8. Uplifting.....Depressing

Once subjects had evaluated the terrace on the semantic differential, the residents questionnaire was then administer (Appendix 1). In order to obtain data from a reasonable cross section of city inhabitants the questionnaire was also administered at other sites within the cities. In Glasgow these were in Kelvingrove Park, Balliol Street and Bath Street. In Edinburgh the additional sites selected were at Rutland Street and Coates Crescent. In these cases where the questionnaire was administered away from Park Circus Place or Randolph Crescent, it was of course not possible for respondents to engage in the semantic differential evaluation of the terraces.

RESULTS

22-29 Park Circus, 15-21 Park Circus, Randolph Crescent

The data from the semantic differential evaluations of the three terraces was entered into the Minitab computer package and analysed using Mann Whitney tests. Results from the three terraces are given in Figure 10.1 and Table 10.1.

Figure10.1 Comparison of semantic differential ratings from three similar terraces, one fully cleaned (22-29 Park Circus), one partially cleaned (15-21 Park Circus) and one soilec (Randolph Crescent).

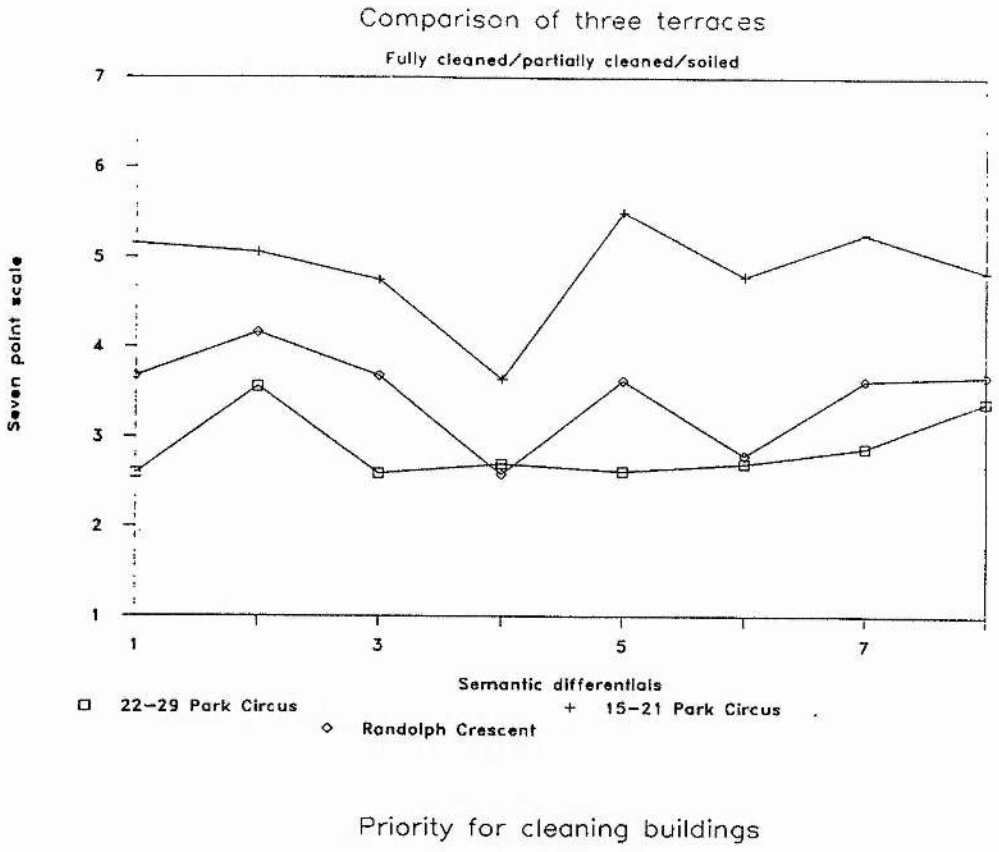


Table 10.1 Results from on site evaluations of terraces

Analysis:- Minitab. Mann Whitney test

1. 22-29 Park Circus, Glasgow (cleaned) N=23
2. 15-21 Park Circus, Glasgow (partially cleaned) N=20
3. Randolf Crescent, Edinburgh (soiled) N=19

	1 2 3 4 5 6 7	P-VALUES 1/2	2/3	1/3
1.	Well looked after.....Shabby	0.000**	.001**	.003**
2.	Cheerful.....Gloomy	0.003**	.066	.083
3.	Attractive.....Unattractive	0.002**	.073	.021*
4.	Has character.....Has no character	0.035*	.048*	.350
5.	Clean.....Dirty	0.000**	.005**	.177
6.	Tidy.....Untidy	0.000**	.001**	.968
7.	Pleasing colour.....Displeasing colour	0.000**	.004**	.076
8.	Uplifting.....Depressing	0.002**	.013*	.369

* Significant at P< 0.05
** Significant at P<0.01

DISCUSSION

Comparisons between 22-29 Park Circus (the terrace cleaned as a single unit) and 15-21 Park Circus (the partially cleaned terrace) on an individual property basis, revealed large and statistically significant differences ($P<0.05$, $P<0.01$) on all of the semantic differentials.

Clearly the cleaning of 22-29 Park Circus as a single unit has resulted in a significant improvement in evaluation in comparison to the architecturally similar 15-21 Park Circus. Numbers 22-29 Park Circus are perceived as "better looked after", more "cheerful", "attractive", "cleaner", "tidier", "uplifting" and generally more of a "pleasing colour" than numbers 15-21 Park Circus.

Interestingly the perception of the character of the terrace has been significantly worsened by the partial cleaning. What cannot be assessed from this data is the extent to which the large difference in evaluations between the two terraces is due to the different colours produced by the cleaning of individual properties in numbers 15-21 Park Circus, or the influence of 21 Park Circus the remaining soiled property in the terrace. When this property is cleaned a second evaluation of the terrace would give clues as to the effect that the remaining soiled building had on overall evaluation.

Randolph Crescent, while not identical to the buildings on Park Circus, still serves as a useful comparison. Evaluations for this uncleaned terrace were generally between those of the two other terraces. Statistical analysis revealed significant

differences ($P<0.01$, $P<0.05$) between the ratings for Randolph Crescent and numbers 15-21 Park Circus on the dimensions of "well looked after-shabby", "has character-has no character", "clean-dirty", "tidy-untidy", "pleasing colour-displeasing colour" and "uplifting-depressing". At first sight these results are somewhat surprising since they show that a moderately soiled terrace can be seen as "better looked after", "cleaner", "tidier", "uplifting" and overall of more "pleasing colour" than a terrace cleaned on a partial basis. It would seem that having a unified terrace divided up into facades of different colours, some of which may be soiled, and others of different cleaned appearance, draws the attention of the viewer to the fact that some facades are more soiled than others. The overall moderately soiled but uniform appearance of Randolph Crescent is not seen as out of the ordinary as there are no cleaned parts of the terrace which contrast with the soiled areas. This is further reinforced by adjacent streets where the policy of non cleaning is also in operation.

The differences between Randolph Crescent and 22-29 Park Circus are smaller. Statistically significant results ($P<0.01$, $P<0.05$) were found on the dimensions of "well looked after-shabby" and "attractive-gloomy". Scores on the dimensions of "has character-has no character" and "tidy-untidy" were almost identical. There tended to be a preference for the cleaned terrace over the uniformly soiled terrace but on the majority of dimensions this difference was not significantly large.

The results of this study suggest a strong case for the cleaning of terraces to be done as entire units to give as far as possible a uniformly coloured facade, rather than the patchwork effect produced by the cleaning of individual facades. The study

also provides evidence that moderately soiled facades can still be evaluated positively.

RESULTS - ON SITE SURVEY : EDINBURGH

A total of 38 people were questioned on site in Edinburgh about their knowledge and attitude to various aspects of stonecleaning. The breakdown by age and length of residence is given in Tables 10.2 and 10.3.

Table 10.2

Age of respondent(years)	Number
Under 20	5
21-30	11
31-40	3
41-50	10
50+	9

Table 10.3

Length of residence	Number
Under 5 years	2
5-10 years	4
11-30 years	14
30+	14
Visitors	4

The first question asked of respondents was to name any buildings or locations which they had noticed had been externally cleaned, and whether or not they were in favour of the cleaning. Table 10.4 gives the results for this along with comments made in favour of the cleaning.

Table 10.4 Buildings/locations which have been externally cleaned: Edinburgh

Location	Frequency	Comments in support of cleaning
Caledonian Hotel	12	Looked unpleasant
		Looked filthy
Usher Hall	5	Looked dirty/untidy
		Cleaning brought out the beauty of the stone
		Image of public buildings is important
Kings Theatre	4	Building was a disgrace to city
North British Hotel	4	Looked dirty/ugly
		An eyesore
Leith	4	Improved reputation of area
		More respectable
		Visually improved
Melville Street	3	Brought street back to what it was
		Improved character
The Mound (Galleries)	3	Cleaning has shown up the colours of the stone from the various quarries
High Street	2	Looked dirty
Atholl Crescent	2	Looks much better cleaned
		Cleaning has brought back the natural colour
Stockbridge	2	Looked dirty/black
Morningside	1	Appearance of area much improved
Haymarket	1	
Tollcross	1	
Drumsheugh Gardens	1	

Results revealed that the Caledonian Hotel, a significant landmark in the centre of Edinburgh, was the most commonly stated building. Other landmarks noted as being cleaned were the Usher Hall, the King's Theatre and the North British Hotel (now the Balmoral Hotel). The other locations which were stated were either prominent streets (Melville Street, High Street, Atholl Crescent) or districts within the city (Leith, Stockbridge, Morningside, Haymarket and Tolcross). Those questioned were in almost total agreement that it was right to have cleaned these buildings. Only three respondents expressed some doubts, one commenting that Melville Street hadn't been cleaned well, one making reference to the general loss of character caused by cleaning and the third specifically citing the Caledonian Hotel, North British Hotel and the King's Theatre where they felt this loss of character had occurred. However the overwhelming view was a positive one in favour of the cleaning which they had noticed.

When asked what buildings or locations should be cleaned (Table 10.5) by far the most common response (37%) was the Sir Walter Scott Monument (Plate 8.2). Approximately two thirds gave reasons of visual appearance for their reasons in favour of the cleaning, for example "looks dirty", "displeasing", "would look better cleaned", and one third gave tourism as the reason. Other buildings and locations mentioned although to a much lesser extent, included Edinburgh Castle, Royal Mile and the New Town area.

When questioned about which buildings shouldn't be cleaned (Table 10.6) by far the most frequently mentioned building (28%) was Edinburgh Castle. Other buildings and locations named, although to a much lesser extent, included the Grassmarket, Scott Monument, old buildings in general, Royal Mile, Old Town, Holyrood Palace

and John Knox House. The main reason given for these not to be cleaned was the potential loss of character and sense of history which stonecleaning might destroy, particularly in the case of the Castle.

Table 10.7 gives a summary of the main advantages and benefits of stonecleaning, as judged by the respondents. Three principal advantages were seen to be gained from stonecleaning, the first being the change in the visual appearance brought about by stonecleaning. 66% of those questioned commented on this aspect of stonecleaning. A second advantage of stonecleaning was seen as the potential boost it gave to the tourist industry, about a third of respondents commenting on this aspect. The third main advantage was seen as the improvement in civic image and pride which stonecleaning was seen as helping to bring about.

Table 10.8 gives an account of the perceived drawbacks of stonecleaning reported by respondents. A number of concerns were raised here. Firstly, the inconvenience caused by stonecleaning in the form of noise, dirt and scaffolding was mentioned by 21% of respondents. Secondly, the potential character loss relating to buildings as a result of cleaning was commented on by about 10% of those surveyed. A similar percentage questioned the cost of stonecleaning. Other comments made included damage to stonework and the safety aspects of the acid used in chemical cleaning processes.

Figure 10.2 gives respondents preference for the priority of cleaning different types of buildings. The graph shows a clear preference for the cleaning of historic and listed buildings and monuments together with significant public buildings. Tenements and rows of houses in streets also tended to be rated highly with over

60% giving these first or second priority. Commercial premises in streets, and in particular, visible facades of industrial premises tended to be rated low in lists of priority. One respondent did not complete this question arguing none of the buildings should be cleaned.

Figure 10.3 gives percentage figures for the general opinion on stonecleaning. 42% of respondents indicated that stonecleaning in Edinburgh had been entirely for the better with a similar percentage saying it had been largely for the better. Clearly a large majority of respondents were in favour of stonecleaning, with a relatively small percentage being opposed.

The question of the effects of partial cleaning were then addressed. Where possible respondents attention was drawn to this effect in the street, following which they were invited to comment on the effect partial cleaning had on the look of the street. Responses were universally negative, comments such as "the street looks uneven", "a patchwork", "silly", "untidy" and "looks odd" were common. Another frequent comment was that it showed up the differences between the cleaned and soiled facades and that the soiled facades were made to look worse.

When asked whether they were in favour of owners being permitted to clean individual facades in terraces 73% said they were, with 18% being opposed. Whether the cleaning of some of the facades was better than leaving them all in their original state was then put to respondents. 68% argued that it was better to have some cleaned, while 26% said leaving them all soiled was better, the remainder being uncertain. The main argument for those in agreement with partial cleaning was that it should be the owners right to clean if they wished, and that

partial cleaning would encourage others in the street to clean. One 32 year old resident seemed to sum up their view by saying:-

> "Although private owners should have the right to clean their buildings, and it may encourage others to do the same, the partial cleaning effect can be an eyesore."

Those opposed to the partial cleaning of terraces tended to argue that the patchwork effect looked worse than a row of soiled buildings and that it didn't improve the appearance of the whole street. As one 70 year old inhabitant put it:-

> "The patchy look of the street cancels out any benefits there may be in cleaning a single building."

A number of respondents both in favour and against the partial cleaning of terraces argued that it would be better if whole terraces were done as a single unit.

The final question asked in the survey was whether stonecleaning had changed the character of Edinburgh. The majority of respondents (58%) said that it hadn't while 29% said that it had. Of the minority of those that said the character had changed, approximately twice as many thought that the character had changed for the better than had changed for the worse. Respondents commented that the image of the city had improved, that it looked more like a capital city, was less gloomy and was more pleasing to look at and live in. The few who thought that Edinburghs' character had changed for the worse, commented about it looking too modern, the way it had lost its old feeling and that it didn't seem like the place they had always known.

Table 10.5 Buildings/places which should be cleaned: Edinburgh

Location	Frequency	Reasons for cleaning
Sir Walter Scott Monument	14	Princes Street tourists
		Displeasing/looks bad
		May preserve it
		Would look better cleaned
Edinburgh Castle	4	Tourism
		Dirty
Royal Mile	2	Looks uncared for
		Looks bad for tourists
New Town	2	Looks dirty
Havmarket	1	Looks dirty and neglected
East end of city	1	Years of grime don't look good
George Street monuments	1	Tourism
Gladstones Land	1	Tourism
The Tron	1	Tourism
Chamber Street Museum	1	Public building
Edinburgh Academy	1	

Table 10.6 Buildings/locations which shouldn't be cleaned: Edinburgh

Location	Frequency	Reasons against cleaning
Edinburgh Castle	10	Clean stone wouldn't reflect its age
		Cleaning would spoil it as it would look too new
		It's always been like that
		Loss of character
		Old/historic
		As it's old it should be left in its original state
Listed/old buildings	2	Likely to suffer damage
		Loss of character
Sir Walter Scott Monument	2	Looks more authentic dirty
		Cleaning makes old historic buildings look as if they were built yesterday
Grassmarket	2	Loss of character
John Knox House	1	Cleaning would take away history behind the building
Royal Mile	1	Loss of character
Old Town	1	Loss of character
Holyrood Palace	1	

Table 10.7 Reasons/benefits in favour of stonecleaning: Edinburgh

Reason/benefit		Frequency (%)
Visual		66
	Improved appearance/tidy/smart	
	Removal of dirt	
	Restoration of original beauty	
	More cheerful	
	See stonework	
Tourism		34
	Good for tourism	
Civic image/pride		18
	Better image	
	More pride	
	Keep up high standard of Edinburgh	
	Tenement occupiers more pride less vandalism	
Preservation		5
	Preservation of old buildings	
Historical		5
	Return Edinburgh to what it used to be	
Property Values		3
	Increased house values	

Table 10.8 Drawbacks to cleaning or reasons for not cleaning: Edinburgh

Reason		Frequency
Inconvenience		7
	Sandblasting - dirty/messy	
	noisy	
	scaffolding	
Character		4
	Character loss	
	Takes away historical value	
	Some old buildings look better dirty	
Financial		5
	Waste of money	
	Money better spent in other ways	
	Return to same colour in 20-30 yrs	
Damage to stone		2
	Acid damages stonework	
Safety		2
	Safety of acid used in cleaning	

Figure 10.2 Respondents preference for the priority of cleaning different types of building in Edinburgh

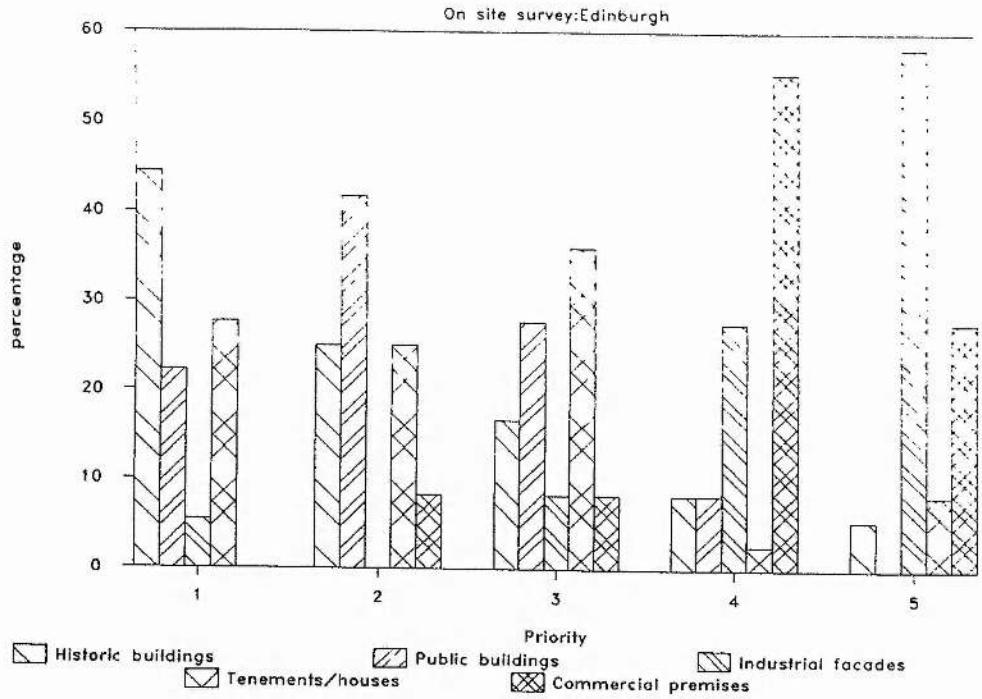
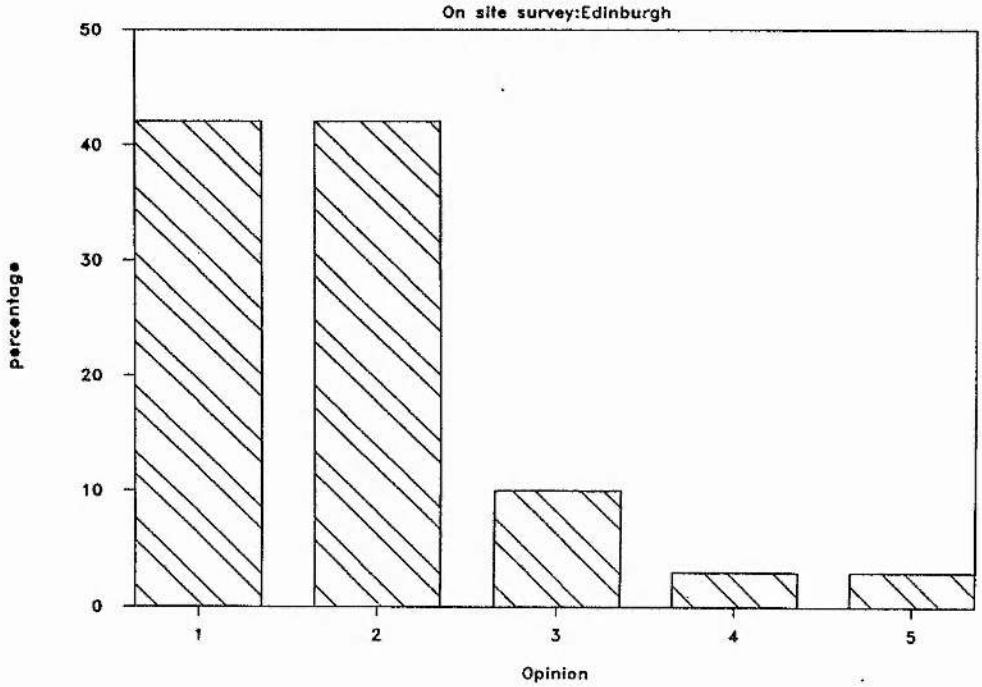


Figure 10.3 General opinion on the results of stonecleaning by respondents to the on site survey from Edinburgh.

1. Entirely for the better.
2. Largely for the better.
3. Neither for better or worse.
4. Largely for the worse.
5. Entirely for the worse.



RESULTS - ON SITE SURVEY : GLASGOW

In Glasgow a total of 177 residents (110 males, 67 females) were interviewed. The breakdown by age and length of residence is given in Tables 10.9 and 10.10.

Table 10.9

Age of respondent (years)	Number
Under 20	13
21-30	65
31-40	33
41-50	30
50+	36

Table 10.10

Length of residence (years)	Number
Under 5	15
5-10	17
11-30	68
30+	70
Visitors	7

Respondents were asked first to name buildings or locations in the city which they had noticed had been stonecleaned. Table 10.11 gives an analysis of the responses. Four buildings in particular were frequently named, these being the City Chambers, Mitchel Library, Kelvingrove Art Gallery and the Kelvin Hall all significant landmarks in the city. The vast majority of respondents felt that it was right to have cleaned these buildings. Other buildings mentioned but to a lesser extent were tenement blocks, Charing Cross Mansions, Central Station Hotel and St Mary's Cathedral. Other responses fell into two broad categories, either prominent streets usually in the city centre or the naming of districts within the city.

The second question asked was which buildings or locations in the city should be cleaned (Table 10.12). A number of buildings were mentioned here, particularly Glasgow University, Elgin Place Congregational Church, tenement blocks, Royal Infirmary, Glasgow Art School and Glasgow Cathedral. In addition a number of central streets were suggested, the most frequently mentioned being Great Western Road.

Asking which buildings shouldn't be cleaned (Table 10.13) very few responses were produced. The Art school, Elgin Place Congregational Church and the University of Glasgow were very occasionally mentioned as were historic buildings in general and old buildings which might suffer structural damage. The reason given for not cleaning seemed to be the potential loss of character which these individuals felt would result from cleaning.

Table 10.14 gives a summary of the main advantages and benefits of stonecleaning as seen by the Glasgow respondents. The visual aspects were seen as the main advantage of stonecleaning with 63% responding with comments related to appearance. The second most frequently reported benefit was the psychological boost which stonecleaning was thought to give. Almost 27% commented on this aspect particularly in relation to the cleaning of tenement properties and office blocks. Frequently made comments referred to the fact that cleaned buildings were less depressing places to live in, and made the working environment more cheerful and pleasant place to operate in. Another reported benefit was the improved civic image that stonecleaning had helped to foster. Some mentioned the way in which areas of the city were improved by stonecleaning. One office worker in the Park Circus area commenting about the change in image of the area said:-

> "Park Circus used to be a right dive. Now it's a good address to have on the top of your paper."

Other perceived benefits included the impact on tourism and the improvement to streetscaping, property values, architecture and historical character of buildings.

Table 10.15 gives a summary of the responses to the question of the perceived disadvantages and drawbacks to stonecleaning. The most commonly cited drawback (named by 28% of respondents) was the financial cost of stonecleaning, although only a very small number of people indicated that the cost was not worthwhile. The second most commonly sited response (21.9%) was the possible damage to buildings caused by the cleaning process. Some respondents showed knowledge of the damage which can be caused by stonecleaning. These included comments relating to loss of stonework detail, chemical damage, increased porosity, removal of a protective layer and increased speed of erosion. Other drawbacks cited included the inconvenience while stonecleaning work was in progress, although a number also added that they thought the inconvenience was worth it. Loss of character to some older buildings was also mentioned as was poor streetscaping.

Table 10.11 Buildings/locations which have been cleaned: Glasgow

Type/location	Frequency	Reasons in favour of cleaning
Central buildings		
City Chambers	50	Used to spoil the look of George Square
		Restored to original state
		Retained character
		More attractive cleaned
		Important buildings need to look impressive
		Better image for Glasgow
Mitchell Library	40	Shows what a nice building it actually is
		Looks good
		Was filthy
		Visible from motorway so lots of people see it
		Tourism
		Important building
Kelvingrove Art Gallery	31	Building asset to city and should be looked after
		Restored to original state
		Retains character
		More attractive cleaned
		Needed facelift
		Building stands out more
		Looks nicer
		Nice colour
		Good for city's image
Kelvin Hall/Museum	28	Restored to original state
		More attractive
		Looks more appealing
		Looks lovely
		Good for city's image
		Prominent building
Tenements	17	Improved appearance
		More pleasing to live in
Charing Cross Mansions	11	Looked neglected
		Looks better
Central Station Hotel	9	Good for city's image
		Stands out
		Looks attractive
		Previously dirty
St Marys Cathedral	5	Cleaning shows beautiful architecture
Travel Centre (St Enochs)	3	
St Georges Mansions	2	Adds to character of area
		Improved appearance
Co-operative	2	
TSB (Glassford St)	1	Good for bank's image
Provost Lord House	1	

Type/location	Frequency	Reasons in favour of cleaning
Central Streets		
Sauchiehall St.	4	
Buchanan St.	2	
Bath St.	2	
Argyle St.	2	
Woodlands Road	2	
Devonshire Gardens	2	
Berkley St.	1	
Park St.	1	
West Princes St.	1	
Dumbarton Road.	1	
Districts		
Partick Fire Station	3	
Woodlands	2	
Cathcart	1	
Maryhill	1	
Queens Park	1	
Pollockshields	1	

Table 10.12 Buildings/location which should be cleaned: Glasgow

Location	Frequency	Reasons for cleaning
Central Buildings		
Glasgow University	23	Depressing place to work
		Attractive building more so if cleaned
		Would enhance image of Univ. and Glasgow
		Restore it to the way it used to be
		It's a mess/dirty
		It's a figurehead for Glasgow
		Architecturally superb
		More attractive to future students
		Central building
Elgin Place Congregational Church (Follies Discotheque)	13	Probably the messiest building in Glasgow
		Attractive building would look better cleaned
		Depressing colour
		Doesn't blend in with rest of street
		Eyesore
Tenements	17	Depressing to live in
		People need friendlier healthy environment to live in
		Enhances character
		Look gloomy
Royal Infirmary	11	Looks bad
		Would be better for patients and staff if cleaned
Glasgow School of Art	8	Looks dirty, depressing
		Nice building would be noticed more if cleaned
Cathedral	7	Looks black
		Shows up against new buildings
Office blocks	6	Better environment for work
		Feel happier entering clean office rather than filthy one
		Businesses look smarter if the building is clean
Italian Embassy	6	
Connal Building	2	
Longside Memorial	2	Historical significance
Cannon Grand Cinema	1	Dirty
Commercial Union	1	
Central streets		
Great Western Rd.	6	
West George St.	1	
West Regent St.	1	
West Princes St.	1	
George Sq.	1	Main tourist area
Argyle St.	2	
Prince's Sq.	2	Eyesore
Union St.	1	
Queen St.	2	

Bothwell St.	1	
St Vincent Terrace	1	
Buchanan St.	2	
Kirklee Terrace	1	
Districts		
Woodlands	1	
Easterhouse	1	
Pollockshields	1	

Table 10.13 Buildings/locations which shouldn't be cleaned: Glasgow

Location	Frequency	Reasons against cleaning
Historic buildings	3	Loss of character
Glasgow School of Art	2	Loss of character
Elgin Place Congregational Church	2	Loss of character
Univ. of Glasgow	2	Nice as it is
Old buildings	4	Danger of structural damage

Table 10.14 Reasons/benefits in favour of stonecleaning: Glasgow

Reason/benefit		Frequency (%)
Visual		63
	More attractive	
	Pleasing to the eye	
	Brighter/cleaner	
	Looks nicer	
Psychological		26.7
	Makes nicer place to live/work	
	Less depressing	
	Boosts morale/happier	
	Nicer atmosphere	
Civic image/pride		19
	Better image for Glasgow	
	Gives pride in city	
	Gets away from slum image	
Tourism		15
	Better for visitors	
	Good for business	
Streetscape		10.5
	Buildings look tidier	
	Buildings stand out more	
Architectural		6.3
	Brings out design and stonework	
	Appreciate architecture of building	
Historical		5.8
	Restore to original state/colour	
	Retain/enhance character	
Property value		5.2
	Improved house prices	

Table 10.15 Drawbacks to cleaning or reasons for not cleaning: Glasgow

Reason		Frequency
Financial		28.8
	Prohibitive cost	
Damage to stone		22
	Remove existing protection	
	Loss of intricate stonework	
	Poor workmanship	
	More porous	
	Increased speed of erosion	
	Chemical damage	
Inconvenience		8
	Noise	
	Scaffolding	
	Time	
	Mess	
Character		8
	Loss of character	
	Some old buildings have character and should be left the way they are	
	Some buildings look nice as they are	

Figure 10.4 Respondents preference for the priority of cleaning different types of buildings in Glasgow

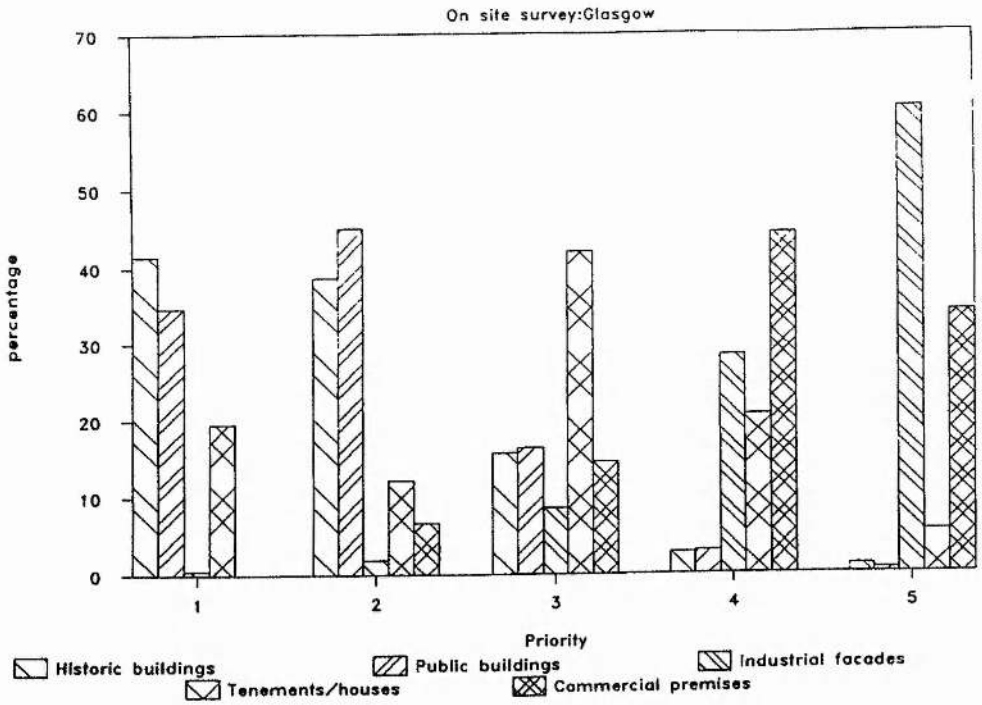


Figure 10.5 General opinion on the results of stonecleaning by respondents to the on site survey from Glasgow

1. Entirely for the better.
2. Largely for the better.
3. Neither for better or worse.
4. Largely for the worse.
5. Entirely for the worse.

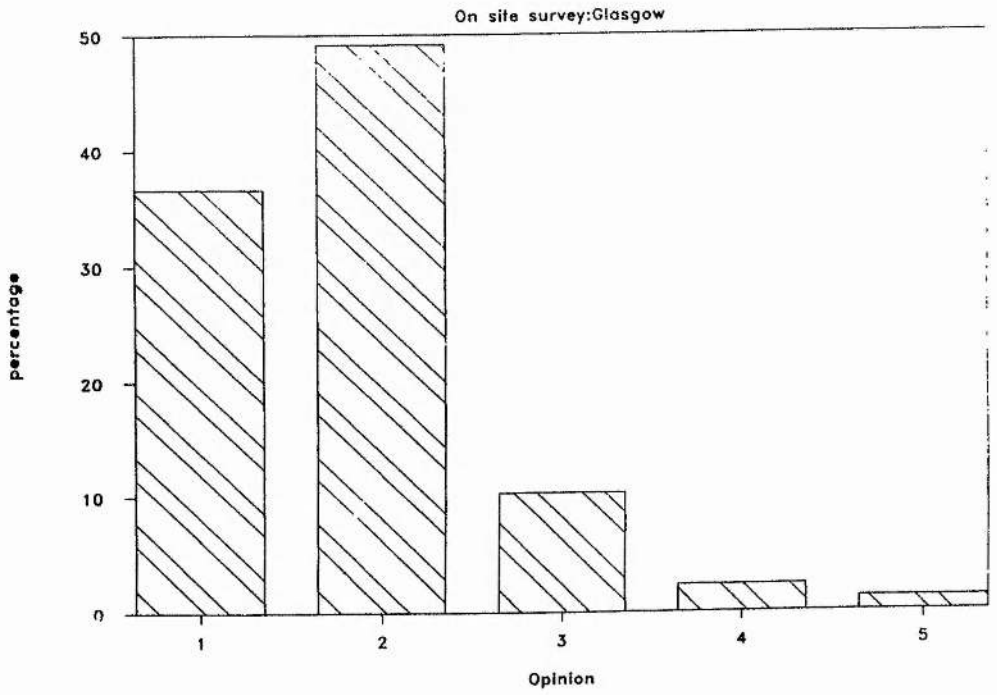


Figure 10.4 provides a summary of the rank ordering for the cleaning of various types of buildings. Historic or listed buildings and significant public buildings tended to receive consistently high ratings, whereas industrial facades and commercial premises in streets were generally rated low in terms of priority for cleaning. Tenements and rows of houses in streets produced the widest distribution of responses. The general tendency was for most respondents priority to be historic and public buildings followed by tenement and house cleaning, although a significant number (19.5%) put the stonecleaning of tenements and houses first. Four respondents declined to answer this question arguing that none of the building types should be cleaned.

Figure 10.5 gives the overall general opinion of stonecleaning for Glasgow respondents. Over 85% of respondents indicated that stonecleaning had been entirely or largely for the better.

Respondents attention was then focused on the effects of partial cleaning. Overwhelmingly, as with the Edinburgh respondents, the comments were negative. The most frequently made remark was that the soiled facades were highlighted, and were made to look worse. Others commented on the patchy appearance of streets, while others simply commented that it looked a mess. However, as in Edinburgh, the majority (70.5%) were in favour of individual owners being permitted to clean individual facades in terraces, with 13.8% being opposed. A majority (62.7%) were also of the opinion that cleaning some of the facades was better than leaving them all in their original state, with 18.3% taking the opposite view. The two main reasons given by those in favour of the cleaning of

individual facades was that some cleaning was better than none at all, and that it would have the effect of encouraging others to stoneclean their properties.

Finally, the question of the possible change in character of Glasgow as a result of stonecleaning was addressed. Responses to this question indicated that 53% thought it had changed as opposed to 24% who thought it hadn't (23% being uncertain). The vast majority (96.7%) of those who thought the character had changed argued that it had changed for the better. A number of respondents made reference to the negative image which Glasgow once had and felt that stonecleaning had contributed to, or reflected this change of image. As one 32 year old resident commented:-

> "The character of Glasgow as a city has changed, people are more aware and take a greater interest in the advancement of the city's reputation. Cleaning buildings has helped this process."

Other respondents talked in similar terms of Glasgow having had a bleak and dismal reputation and that stonecleaning had returned buildings to their original character. A number commented on Glasgow being brighter and appearing more friendly, and in general being a better place to live.

DISCUSSION

The on site surveys conducted in Edinburgh and Glasgow provided an opportunity to gauge the attitude of a reasonable cross section of inhabitants of the cities to stonecleaning. A number of respondents indicated that this was not an issue to which they had previously given a great deal of thought, and thus for many the survey was the first time the issue had been considered in any great depth.

The survey data not only provides an opportunity to study attitudes to stonecleaning within Edinburgh and Glasgow, but also to compare similarities and differences between the two cities.

In terms of residents awareness of cleaned buildings, the data from Edinburgh and Glasgow show close similarities and lend support to the view of Lynch (1960) in terms of the way cities are imaged. Lynch (1960) argues that five types of element are important in the mental images of cities, these elements being paths, edges, districts, nodes and landmarks. Residents awareness of cleaning tended to reflect these elements. In terms of cleaned buildings or locations remembered the most frequently recalled were prominent landmarks in the cities. In the case of Edinburgh these were the Caledonian Hotel, Usher Hall, King's Theatre and the Balmoral Hotel. In Glasgow they were the City Chambers, Mitchel Library, Kelvingrove Art Gallery and Kelvin Hall. Also recalled were prominent buildings along prominent paths in the cities. In the case of Edinburgh these included Melville Street, High Street and Atholl Crescent and, in the case of Glasgow, Sauchiehall Street and other prominent central streets. The other type of response which tended to be given was to name districts within the cities where cleaning had taken place, rather than the naming of buildings or streets within these districts.

It seems from this evidence that Edinburgh and Glasgow are imaged in similar ways to those which Lynch (1960) suggests and that residents awareness of stonecleaning follows a similar pattern. It may well be that when considering which buildings to clean in a city these elements could form guidelines,

particularly if one of the intentions of stonecleaning is to change the mental image which people have of the city. The decision as to which elements of a city should be cleaned could have a significant impact on the extent to which the image of a city is changed. The pattern of responses for the naming of buildings and locations which had been cleaned was repeated for locations which respondents thought should be cleaned. These tended to be either significant landmarks, paths or districts in the cities.

The question of which buildings residents thought should not be cleaned provided evidence that there may be buildings which, because of their historical significance, level of soiling, or an interaction of the two are regarded by residents as being better left in their soiled condition. There was some disagreement amongst respondents as to which buildings fall into this category. The majority of Edinburgh respondents clearly felt that Edinburgh Castle is one such building, others felt that the Scott Monument also falls into this category, and yet this was the most frequently mentioned building that respondents thought should be cleaned.

A similar pattern emerges with the Glasgow data. Buildings frequently cited as needing cleaning included Glasgow University, Glasgow School of Art and Elgin Place Congregational Church, and yet these were occasionally seen by others as potentially losing their character if cleaned. Clearly the question of the potential loss of character of older buildings following stonecleaning is of concern as this potential drawback of cleaning was reported by a significant number of the respondents. The relationship between soiling, aesthetics and character is explored in greater depth in later chapters.

The main advantage of stonecleaning was seen by residents of both cities to be the visual improvement brought about by cleaning. This was seen mainly in terms of the removal of soiling revealing more attractive facades. There was evidence of some differences in the perceived benefits of stonecleaning between the two cities. The second most frequently given response in Edinburgh (34%) was the improvement to the tourist trade, whereas in Glasgow this was the fourth most frequently cited by respondents (15%). The second most regularly given response by Glasgow residents (26.7%) was the psychological effect of stonecleaning, many of respondents commenting on the effect on both residential tenements, houses and working environments. The differences perhaps also reflect the historical significance of the two cities, in terms of the importance of tourism and the image of the cities as living and working environments. Civic pride was also consistently mentioned by both sets of respondents. Many commented favourably on the effect of stonecleaning in this respect.

The drawbacks to cleaning tended to group around four main issues:- financial, inconvenience, damage and character loss. The financial and inconvenience drawbacks tended to be seen as temporary, only a few respondents indicated that these should be seen as sufficient reasons for not cleaning. Without presenting detailed figures for the cost of stonecleaning (which was not feasible on site) it was not possible to accurately judge what proportion of respondents would feel that the cost was not worthwhile.

The question of the priority for the cleaning of various types of building produced similar results for the two sets of respondents, with historic and significant public buildings being rated as high priorities and with a significant number of

respondents also indicating that tenements and rows of houses should also receive high priority. Commercial premises in streets and industrial facades tended to be rated low in terms of priority.

Respondents opinion of stonecleaning was generally favourable. Three distinct groupings emerged from the data:-

1. A large grouping of respondents who were entirely in favour of stonecleaning, who were enthusiastic about the cleaning which had taken place within the cities and were in favour of all soiled buildings being cleaned.

2. A second large grouping of respondents who were largely in favour of stonecleaning, but who had some reservations about the wholesale cleaning of all buildings. These reservations concerned issues of loss of character, cost, or the types of buildings cleaned. This was not a homogeneous grouping. In terms of character loss, while most argued that the cleaning of Edinburgh Castle would be detrimental, there was less agreement about which other buildings this would apply to.

3. A third very small group were totally opposed to stonecleaning on a number of grounds. These included cleaning adversely effecting the look of buildings that had been soiled for many years, and that financial resources would be better spent in other ways.

The visual effect of partial cleaning (which only a few respondents made mention of before being directly asked) was viewed negatively by the great majority of both

sets of respondents, although it was felt by most that it should be the right of building owners to clean if they wished. The majority also felt that cleaning individual properties in terraces was better than leaving them all soiled. The view generally expressed was that this would encourage others to clean. The substantial drawback to this piecemeal approach to cleaning is that this leads to individual facades of terraces being of different colour (as was the case in Park Circus considered in chapter 9). This particular problem was not commented on by respondents, who seemed to look at buildings as simply clean or dirty.

In terms of the change in character of the cities as a result of stonecleaning, there were response differences between residents of Edinburgh and Glasgow. Residents in Glasgow were more likely to view stonecleaning as a force for changing the character of the city than were residents of Edinburgh, perhaps reflecting the belief that Glasgow has undergone a character change in recent years.

Chapter Ten (part 2)

Residents survey :- Wardlaw Street

INTRODUCTION

A significant proportion of the stonecleaning work undertaken in Edinburgh and Glasgow involves the cleaning of tenement housing. In most cases stonecleaning is carried out as part of total renovation schemes in which extensive repairs and alterations are made to properties. Edinburgh District Council sponsors tenement rehabilitation schemes in housing action areas. Wardlaw Street (Plate 10.4) which is situated of Gorgie Road in Edinburgh achieved action area status in April 1987. As the last tenement in the street had been stonecleaned as recently as 1989, this street formed the basis of a social survey. The aim of this survey was to ascertain tenement residents' views of the relative benefits of stonecleaning in comparison to other improvements made to the tenements.

With action area status the tenements in the street underwent complete refurbishment. This included external work, principally involving stonecleaning, re-roofing, damp-proofing, window painting, new downpipes, garden improvements, and new front doors where an entry phone systems were installed. Internal structural work was also carried out involving new proprietary flooring, stairway painting, provision of a communal television aerial, as well as electrical and plumbing work.

The main contract for the tenement repairs was covered by an improvement grant which covered 75% or 90% of the repairs to the tenement. Each household was means tested to determine the level of the improvement grant. The stonecleaning

work was funded by a 100% Environmental Improvement Grant. Thus stonecleaning was the only aspect of the refurbishment programme to which the householders did not have to contribute.

The way in which the improvement programme operated meant that each tenement in the street came under the jurisdiction of different agents. These agents employed different contractors to carry out the stonecleaning work. Thus the row of tenements in Wardlaw Street were cleaned at different times by different contractors. The result of this piecemeal approach to cleaning what is a unified terrace, is tenements of differing colour (Plate 10.4).

METHOD

Wardlaw Street residents were approached in their own homes and asked if they were prepared to answer questions about the renovation programme in the street. At no stage were they informed that stonecleaning was the focus of the research. Residents from 17 different tenements were interviewed. Only the responses from residents who had lived in the tenements before the refurbishment scheme had started were incorporated in the analysis. The distribution of age of respondents is given in Table 10.16. The household composition of those questioned is given in Table 10.7.

Plate 10.4 Wardlaw Street, Gorgie, Edinburgh.

Table 10.16 Age of respondents

Age of respondents (years)	Number
20-30	4
30-40	12
40-60	5
60+	6
TOTAL	27

Table 10.17 Household composition

Household membership	Number
Single person	14
Married couple	8
Single parent and child	4
Married couple and children	1

RESULTS

The first question asked was a general one about which features of the improvements in the street had made the most welcome change (Figure 10.6). 70% of respondents answered that it was the stonecleaning. The appearance of the stairs and entryphone system were also mentioned as were, to a lesser extent, the window painting and roof repairs. Given the extensive range of renovations carried out in the street, the large proportion giving the response of stonecleaning, is to an extent indicative of its value to residents.

All the owners, except two who were uncertain, thought that the improvements had increased the value of their properties. When asked what they thought had contributed most to this increase in property value (Figure 10.7) a range of responses were given. It seems that the structural work, roof repairs and the stairway improvements (i.e. the major structural repairs and changes) were seen as being the most important in terms of actual property value, whereas stonecleaning was seen more in terms of a personally liked change.

In order to ascertain more directly liking for specific improvements, residents were asked to indicate on a five point scale (1-slight improvement, 5-considerable improvement), their views on the following improvements:- entryphone system, proprietary flooring, stair painting, stonecleaning and communal television aerial. Figure 10.8 gives the results for this question.

Clearly all the improvements were liked, with stonecleaning being put in the most liked category by over 80% of respondents. Asked whether the general character of the street had changed as a result of stonecleaning, residents were divided. 63% thought it had as opposed to 27% who thought it hadn't. Figure 10.9 gives the

reasons why those who thought the character had changed did so. One female resident seemed to sum up their view:-

> "I know it's only an optical illusion but the street looks wider and brighter.....it's given people a pride which wasn't there before."

Living in a better residential area, in a more marketable and desirable property were typical reasons given for the change in character. The most common response given by those who felt that there had not been a change in character was that the street was still not kept clean.

Residents were fairly evenly divided between those who felt it was better than they had expected (N=11) and those who said the result was as they had anticipated (N=15). Only one resident said it was worse than they had expected. A large number of those in the "as expected" group said they had seen other similar tenement refurbishment schemes involving stonecleaning. One resident commented that the impact of the stonecleaning was lessened due to the work being carried out in stages.

The residents were in complete agreement that their preference was for the front of the tenements to be cleaned, this was true even for residents at the rear of the blocks. This unanimous result was a little surprising in view of the fact that a number of the residents flats overlook the uncleaned backs of adjacent tenements, and many sat outside during the summer in rear gardens. A large number of residents indicated that they would have liked both front and rear cleaned.

Figure 10.6 Feature of the improvements to Wardlaw Street which have made the most welcome change in the opinion of residents.

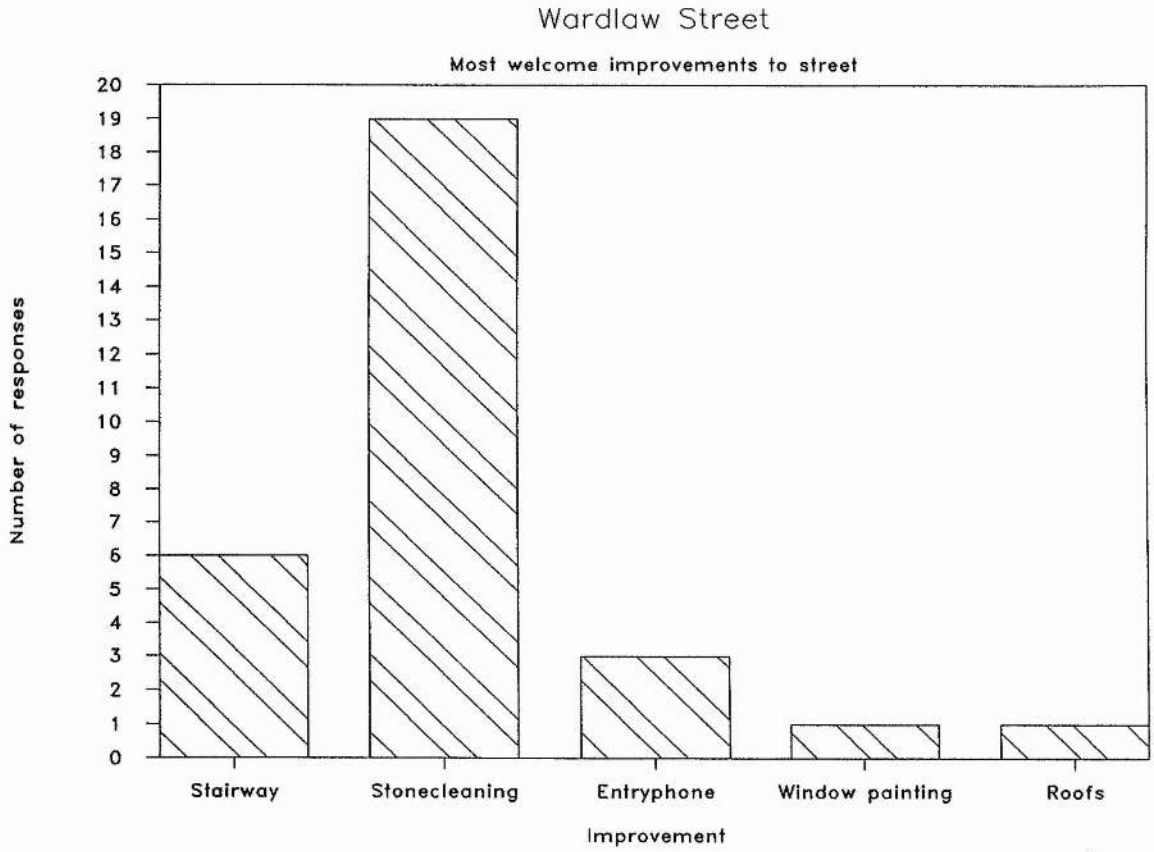


Figure 10.7 Improvement which had contributed most to an increase in property value in the opinion of residents.

1. Structural work
2. Roof repairs
3. Stairway improvements
4. Stonecleaning
5. General upgrading
6. Internal work
7. Windows
8. External appearance
9. Entryphone system
10. Increased desirability of area

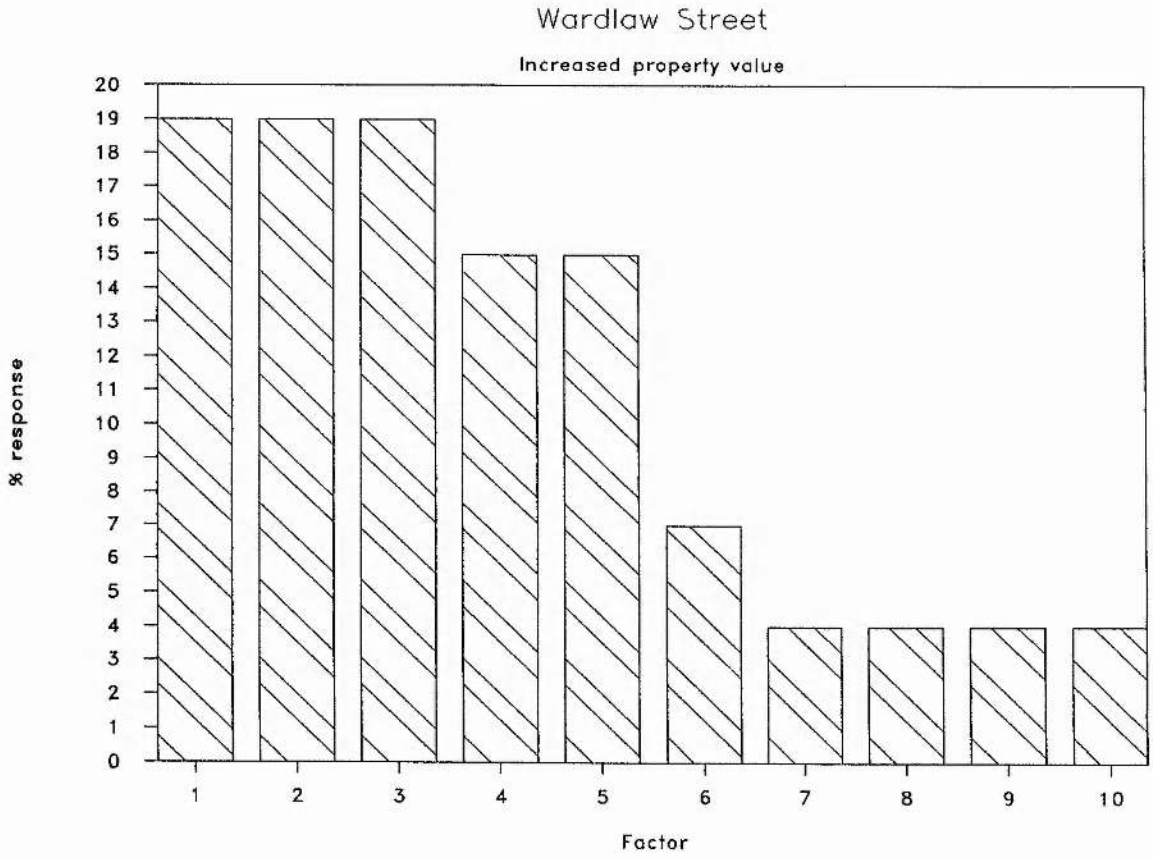


Figure 10.8 Ratings for residents liking of improvements to Wardlaw Street.

1. Slight improvement
2. |
3. |
4. |
5. Considerable improvement

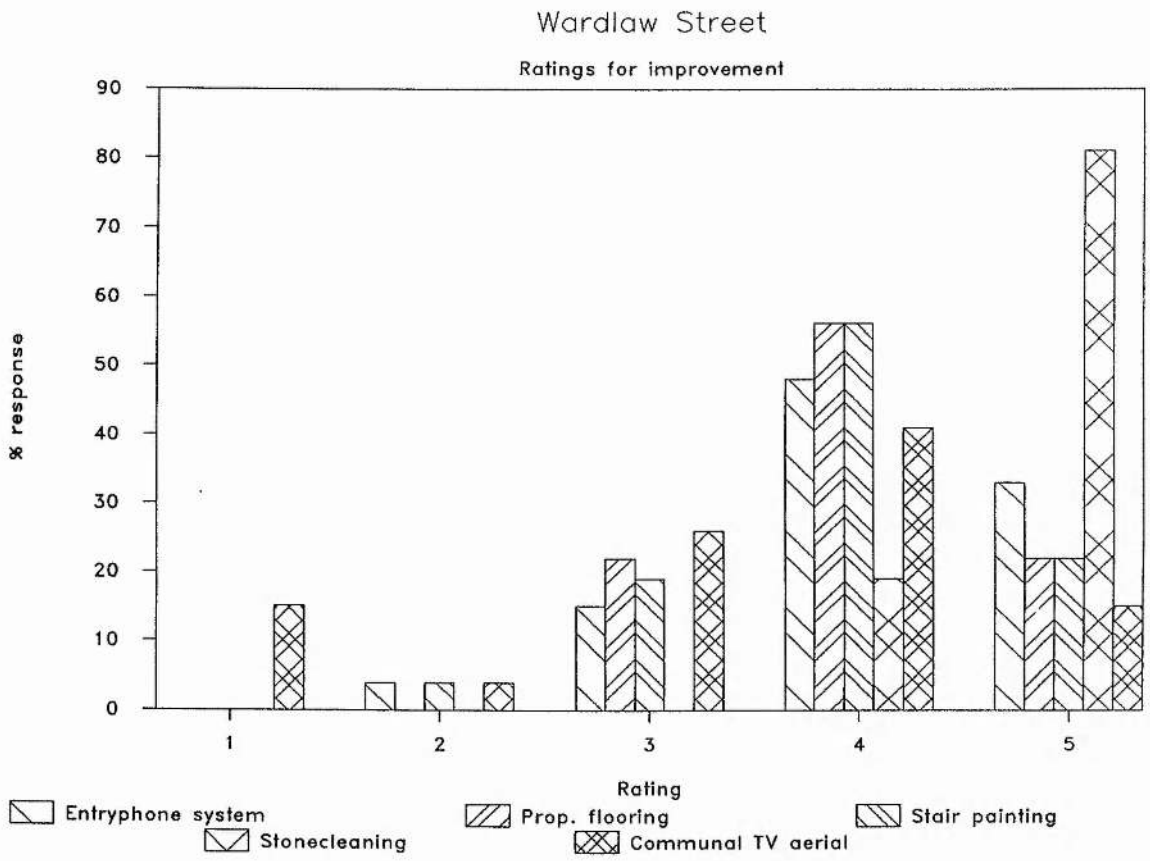


Figure 10.9 How residents feel the character of Wardlaw Street has been affected by stonecleaning.

1. Street looks much brighter / bigger.
2. Better residential area / change from slum.
3. Property more marketable / desirable.
4. Less depressing place to live.
5. Improved pride.

Although the stonecleaning was the only part of the refurbishment which was 100% funded by the environmental improvement grant scheme, residents were none the less asked if they would have been prepared to pay for the stonecleaning if it had been costed in the same way as the other work in the tenement. Table 10.18 gives the figures for these responses and the numbers who would have been prepared to pay their share of the total cost of the stonecleaning. All the residents except two indicated their willingness to have paid a proportion (either 10% or 25%) for the stonecleaning. A large percentage (approx. 60%) indicated they would have been prepared to pay their share of the total cost of the stonecleaning.

Table 10.18 Funding of stonecleaning work

	Residents willing to fund stonecleaning at the same rate as refurbishment (10%/25%)	**Residents willing to fund stonecleaning at 100% rate**
Yes	25 (92.6%)	16 (59.3%)
No	2 (7.4%)	5 (18.5%)
Uncertain	0	6 (22.2%)

The main adverse comment raised about the stonecleaning process was the dust and mess produced in the process, although many qualified their answers by saying that they thought it was probably unavoidable. One resident questioned why a number of contracting firms had be employed to do the cleaning and not just one.

DISCUSSION

Wardlaw Street is a fairly typical example of tenement architecture prevalent throughout much of Edinburgh. In recent years many of these tenement blocks have undergone extensive refurbishment schemes which typically involve stonecleaning. It is clear from the responses of the residents that the changes have made a marked

improvement to the quality of the properties and to the residents feelings about the neighbourhood. One of the most welcome changes residents reported was the stonecleaning, even if in financial terms the structural work is seen as more important. The value of the stonecleaning to the residents can be judged by the number prepared to have put their own money into the work. Even allowing for any social desirability responses, the numbers are quite large, particularly in view of the fact that Wardlaw Street represents property at the lower end of the market with residents likely to have a corresponding income.

With little more than a roads width separating opposite tenements on the street, and with the tenements being four storeys high, at street level the change in the quality of light after stonecleaning is quite marked. Uncleaned streets of this type can appear dark and depressing, and stonecleaning, certainly in the view of residents, does make a considerable difference. It is difficult to judge what the longer term effects in terms of subsequent resoiling and changes to the stone itself might be.

Chapter Eleven

Economic survey

INTRODUCTION

One of the main motivations of clients for owners to have their properties stonecleaned is for the perceived increase in property value which is thought to result from cleaning. No empirical studies to establish the extent, if any, of this change in value have been conducted to date. A survey of professionals involved in the valuation and selling of both domestic and commercial properties in both Edinburgh and Glasgow was therefore undertaken. The aim of this survey being to establish what effect stonecleaning had on both the valuation and marketability of properties within the cities, and to test the assumption that stonecleaning did indeed increase property value.

METHOD

Respondents were contacted by means of a personal call at their offices and were asked if they would be prepared to be interviewed. The interviews took place in either a single office or a quiet area within the main office. Interviews were of a semi-structured nature. Table 11.1 indicates the positions of those interviewed.

Table 11.1 Professions of interviewees

Position of respondent	Number
Property valuer/surveyor	9
Property manager	8
Company directors (estate agency)	3
Total	20

RESULTS

In the case of domestic properties, all except one of the respondents were of the opinion that stonecleaning did have an effect on the value of properties, the exception being an Edinburgh property manager who thought it had no effect. 70% indicated that the effect was usually to increase the value, the rest stated that stonecleaning, in their opinion, always increased the value. One property manager said that following the cleaning and the use of a sealant on a property which they were handling, an orange staining had appeared on the stonework (probably the result of iron migrating to the surface following an acid clean). In this case they had advised the client to have the building painted as they felt the sale would have been blighted.

In order to ascertain the extent of the increase in value resulting from stonecleaning, respondents were then asked to estimate what effect it would have on different types of properties. Two broad categories of property were suggested to respondents:-

(a) Tenement flats costing in the region of £30,000 to £50,000.

(b) Residences in the more expensive sector of the market costing over £100,000.

This proved a difficult question to answer as property valuation is often very subjective, depending as it does on a range of interacting factors. From the responses it seems that the increase in value is more evident in the lower price range. In the case of tenement flats respondents were fairly evenly divided between those who estimated the value increase to be between a few hundred and a thousand pounds,

and those who put the figure at between one and two thousand pounds. With this type of property, stonecleaning is usually only carried out as part of a total refurbishment scheme, and therefore it was difficult for respondents to estimate its value in isolation. In the case of the more expensive properties respondents were much more divided. About half thought stonecleaning had no effect or was not a consideration in the price. Those who thought it did have an effect were unable to speculate beyond saying a "few percent". Two respondents indicated that cleaning might be detrimental to the value, one suggesting:-

> "Dirt makes properties look older and more established and therefore it might be beneficial to leave it."

The other talked about the dangers of more expensive properties looking over restored.

If there was some doubt as to the precise financial value of stonecleaning there was unanimity about its effect on the marketability of properties, many commenting on this aspect before they were directly asked. It was difficult to quantify its effects but half put it as moderate , the rest describing it as minor. Typical of the comments made about marketability were the effect it had in making properties look more attractive, particularly in terms of the photographs used in estate agents windows. The fact that a property had been stonecleaned was often mentioned in the estate agents particulars. The other main perceived attraction of stonecleaning for purchasers was that this was a cost which had been dealt with and therefore one less expense which would have to be met. A number of respondents commented that stonecleaning can lift a whole area and this had implications for property value. Another talked in more general terms about the way stonecleaning had lifting Glasgow's perception of itself. As one manager said:-

"Stonecleaning is the most evident sign of improvement. People imagine it improves the structure but it doesn't."

Another valuer commented that stonecleaned appearances affected the value of properties more than they should, giving an appearance of maintenance which wasn't always justified. However, the vast majority were agreed that this would not be something that they would recommend clients to do immediately before selling as they would be unlikely to recoup their costs in the short term.

The results from the Wardlaw survey seem to substantiate the comments made by respondents in this survey. It seems that the renovations carried out is the key factor influencing price and that stonecleaning is a smaller contributory factor, often undertaken to take advantage of 100% grants. On the negative side, some managers spoke about poor cleaning work which had left buildings looking worse than they had been before they were cleaned. This might deter clients and perhaps in extreme cases have a negative effect on the price. A number of sites in Glasgow were mentioned in the context of poor cleaning including buildings in Bath Street, Barton Road, Queens Cross and Great Western Road.

Nine of the respondents had experience of dealing with commercial properties. Table 11.2 gives a summary of their perception of the main advantages and disadvantages of stonecleaning commercial properties. The main advantage cited was the improved image of companies. A few disadvantages of stonecleaning were mentioned. These centred around the possibilities of poor cleaning work leaving an unattractive finish, and the way in which cleaning revealed hitherto unseen staining. Water staining on buildings on the south side of Great Western Road,

Glasgow was given as an example of this. In the valuers' view it would have been better not to have undertaken the cleaning. There was also some concern among valuers that physical damage could be done to the stonework by cleaning.

In terms of the change in value as a result of stonecleaning respondents were divided two thirds to one third in favour of the view that cleaning had no effect on value. Those that suggested it could increase values said the effect was small and tended to be restricted to sound buildings in the more up-market sector. One valuer indicated that surrounding properties could have an influence. For example, if all other properties in the area had been stonecleaned and the property offered for sale had not, the cost of stonecleaning in this case would be taken into consideration in formulating the price.

Rental values were not affected by stonecleaning, these being governed mainly by floor area. All respondents were agreed that the marketability of commercial properties was helped by stonecleaning, most describing the effect as a minor one. One experienced Edinburgh valuer commented on the way in which stonecleaning clauses were now occasionally being included in leasing contracts, clients being expected to return building in the same state of "cleanliness" as when they took over the property. This type of development is clearly worrying in view of the possible damage to buildings of frequent cleaning.

Table 11.2 Property professionals' comments.

Advantages of cleaning commercial properties	
Company image	Gives clients impression of dealing with reasonable company.
	Building looks more prestigious when clients enter.
	First impressions of client improved.
	Improved commercial image.
Visual/Aesthetic	Improves visual appeal.
	Buildings look better in colour brochures.
	Removes tatty appearance.
	Buildings look better cared for.
	Lifts whole area.
Preservation	Leads to stonerepairs being carried out.
Economic	A cost which will not have to be met in the future.
Disadvantages of stonecleaning commercial properties	
Visual/Aesthetic	Danger of poor cleaning leaving building visually impaired.
	Revealed water staining after cleaning looks worse than soiled building.
Structural	Possible increased weathering effects.
	Increased erosion.
Economic	Stonecleaning a major expense.
	Hinders trade while work in progress.

DISCUSSION

The interviews with professionals involved with the property market reveal that the economic benefit of stonecleaning in terms of increased property value is by no means clear cut. With domestic properties it appears that tenement flats at the lower end of the market are likely to benefit most in terms of price increase, however the rise in value is likely to be fairly small. Whether or not these types of properties have undergone total refurbishment is the major influence on price, stonecleaning alone has only a limited effect. The value of stonecleaning on more expensive properties remains questionable. Where stonecleaning is advantageous is in the marketing of properties. First impressions of the photographs in estate agents particulars, and when properties are first seen, might influence a decision to view and perhaps a sale.

In the case of commercial properties the link between stonecleaning and increases in property values seems even more tenuous. Where there is an effect it is likely to be with structurally sound buildings towards the upper end of the market. The effect of stonecleaning is more likely to be to improve the image of the building from which the company operates and by association, the company itself. Stonecleaning on a large scale can improve the image of whole districts, and this in turn might make areas more desirable.

Chapter Twelve

Survey of architects: RIAS Edinburgh Chapter

INTRODUCTION

Chapter ten gave some indication of the attitude of the residents of Edinburgh and Glasgow to the issue of stonecleaning. It might be expected that professionals involved in the building industry and in particular architects, would have views on stonecleaning which were formulated in the light of their professional training and experience. These attitudes might well differ from those of individuals without architectural training and whose involvement with stonecleaning is essentially only one of a personal reaction to seeing soiled and cleaned buildings.

In order to ascertain a professional view of the aesthetic effect of soiling and stonecleaning within an urban context, a questionnaire survey was undertaken of Edinburgh architects. The aims of the questionnaire were:-

1. To explore with architects their perception of the aesthetic and ethical issues involved in stonecleaning.
2. To explore with architects their views on the effects of effect of soiling and stonecleaning on urban architecture.
3. To compare the views of professional architects with the general public on stonecleaning issues.

A list of all architects, currently registered with The Royal Incorporation of Architects in Scotland within the Edinburgh Chapter, was obtained from the RIAS and a copy of the questionnaire together with a covering letter and a stamped addressed envelope for the return of completed responses was sent to each architect (Appendix 3). A total of 344 questionnaires were sent out, 8 were returned by the

Royal Mail as "gone away" and 52 were returned completed, giving a return rate of 15.5%.

RESULTS

THE GENERAL EFFECT OF STONECLEANING ON THE TOWNSCAPE AND STREET CONTEXT OF EDINBURGH

The first question asked of architects was the effect which stonecleaning in general had had on the townscape of Edinburgh. 51% of architects indicated they had mixed views on the subject, 31% gave entirely positive responses and 12% gave entirely negative responses to the question.

The main positive response given by architects was a general one, that stonecleaning was "beneficial", "an enhancement", "pleasing", "visually widened streets", and improving the look of the urban landscape. Also commented on was the effect it had on lightening and brightening streets, particularly tenement properties. The enhancement which stonecleaning gave to architectural detail and the increased awareness of architecture amongst the public, brought about by stonecleaning also featured in responses. Also mentioned was the effect it had on revealing the natural beauty and colour of stone. Other factors commented upon included the way stonecleaned buildings appeared less depressing and oppressive, were psychologically more uplifting, particularly in residential streets. Some architects commented that stonecleaning was most successful when carried out on major freestanding buildings. A small number commented on the way cleaning once

again allowed the play of light and shade on the building in the way the architect had originally intended.

The main negative effect of stonecleaning on the townscape of Edinburgh (reported by 50% of architects) was the disruptive effect it had on street unity when only parts of streets are cleaned. Also commented on was the detrimental effect on streetscapes of the use of different cleaning methods in the same street, and the use of inappropriate cleaning methods. Other reported detrimental effects of cleaning on streetscapes included colour variations of buildings and bleaching. 6% of architects simply reported that Edinburgh's townscape had been adversely effected or suffered as a result of stonecleaning. Another point made by a few architects was that stonecleaned buildings tended to look better from a distance. As one architect put it:-

> "In most cases buildings which have been cleaned look better when viewed from middle or far distance, but some buildings when seen close up are badly marked, stained, and with poor plastic repairs and indents. Some buildings which have been cleaned 5-10 years previously are beginning to look soiled and more sad than adjacent buildings which have not been cleaned."

Other negative effects reported included the potential accelerated weathering and soiling of stonecleaned buildings, the loss of stonework detail, and the reduction in contrast between buildings and the skyline caused by cleaning.

The responses to the question of the general effect of stonecleaning on the townscape of Edinburgh, reveals that while there are a significant minority of architects who appear to be either totally opposed, or totally in favour of stonecleaning, the

majority have a multiplex attitude to stonecleaning. A measure of this can be seen in the response of one architect:-

> "Stonecleaning has a vast range of effects. Probably the most important, with regard to street context and townscape, is its ability to accentuate particular areas (nodes) within the urban fabric. Where accentuation was the original intent this can be a positive factor, however, aesthetic fragmentation can occur when it is applied to buildings of equal weight in the urban composition, e.g. the terrace."

Three issues in particular seem to cause concern. Firstly, the appropriateness of cleaning different building types, tenements for example were often seen as benefiting most from cleaning. Secondly, the piecemeal approach to cleaning evident throughout large parts of Edinburgh and thirdly the unsatisfactory nature of much of the stonecleaning work in the city. Two architects seem to sum up the position:-

> "Stonecleaning is good in high density Victorian tenement areas when a whole street approach is adopted, good when individual buildings stand on their own, bad when individual buildings break street unity."

and,

> "If the standard of stonecleaning is high and the appropriate method is employed, then the general effect is one of enhancement. It would seem that the public buildings come off best, probably because the work was directed and supervised by someone who knew and appreciated the intricacy of the problems that can arise. Probably these contracts are better instructed and adequately funded."

EDINBURGH SITES IMPROVED AS A RESULT OF STONECLEANING

A range of different Edinburgh buildings and sites were reported to have been improved in terms of townscape and street context. The most frequently sited (40%) were areas with large amounts of tenement properties particularly those of Gorgie, Dalry, Leith, Tollcross, Marchmont and Morningside. The major benefits are seen as improvement in the amount of reflected light, the less oppressive nature of the cleaned buildings and the general boost given to these areas by stonecleaning.

Another frequently mentioned area (23.5%) which had benefited from stonecleaning were some New Town and West End streets, particularly Atholl Crescent (N=4), Melville Street (N=4), St. Stephen Street (N=3), George Street (N=2) and Coates Place (N=1). The success of these cleaning operations was seen to be due to their wholesale nature, i.e. whole terraces cleaned as a single unit. Atholl Crescent was seen by Edinburgh New Town Conservation Committee to have slightly suffered as a result of delays in cleaning some buildings in the crescent.

Other buildings which were seen to have improved as a result of cleaning included the Balmoral Hotel (N=9), the Caledonian Hotel (N=5), the Royal Scottish Academy (N=6), the National Gallery (N=5), Pilrig Church, Leith (N=3), and the Usher Hall (N=3). Other sites mentioned included Lauriston Place (N=4), St Mary's Street and to a lesser extent Register House (N=2), the Post Office (N=1), St Mary's Cathedral (N=1), High Street (N=1), Carlton Street (N=1), Broughton Road (N=1) and Jeffrey Street (N=1). Of the architects who responded, 10% felt that no buildings had been improved by stonecleaning and 4% indicated that all buildings had been improved by cleaning.

EDINBURGH SITES NEGATIVELY AFFECTED AS A RESULT OF STONECLEANING

A number of different buildings and locations were reported to have been negatively affected by stonecleaning. By far the most frequently reported sites (48%) were in the New Town and West End. Of these areas two sites in particular were seen to have been adversely affected, these were Melville Street (N=11) and Rutland Square (N=6). Architects pointed out the effect of stonecleaning on the variations in colour of the stonework from property to property, the negative effect of cleaning a unified street using different techniques at different times, and staining on the stones revealed by cleaning. The effect is summed up by one Edinburgh architect who reported:-

> "Melville Street is the most extreme example of spasmodic cleaning using various methods. A variety of colours and textures mars the unity of design."

Similar comments were made about Rutland Square and Rutland Street, that a piecemeal approach to cleaning had been adopted with the consequent disruption in unity of the square. This has resulted in a range of slightly different coloured building facades adjacent to each other on the street, disrupting the overall composition. Commenting on Rutland Square and Street before any cleaning had been undertaken one architect reported:-

> "...Rutland Square and Street where the contrast, dark walls, bright interiors and leafy gardens was attractive."

The unity of Rutland Square and the aesthetically pleasing interaction of soiled walls, bright interiors and greenery within the square was thus seen to have been marred by the cleaning which has been undertaken.

A number of other streets in the New Town and West End were also mentioned (although to a lesser extent than Melville Street and Rutland Square) in terms of negative streetscape as a result of stonecleaning. These included Alva Street (N=2), Doune Terrace (N=2), York Place (N=2), Dublin Street (N=1), Manor Place (N=1), Raeburn Place (N=1), Annandale Street (N=1), Haddington Place (N=1) and Broughton Street (N=1).

Other buildings seen to have been negatively affected included the Balmoral Hotel (N=5) and tenement blocks (N=4). These are interesting cases as they were also cited by most architects who commented on these as examples of sites which have improved in terms of townscaping as a result of stonecleaning.

The architects who commented negatively about the Balmoral Hotel were largely opposed to stonecleaning in general, but also raised objections in terms of the historical association of the building with steam railways, the range of stone colours which were revealed after cleaning, and the way the building "stands out" in terms of streetscape.

The tenement properties reported by some architects as having been negatively affected by cleaning, were regarded in this way mainly because of the patchy appearance of streets, where individual blocks had been cleaned. It was also felt by one architect that inappropriate methods had been used and poor repair work

carried out. The reported negative effect of the stonecleaning of terraces, appeared to result from procedures and methods rather than the principle of cleaning tenement properties.

Another site mentioned as having been negatively affected by stonecleaning was the Methodist Church/Hall, Tollcross (N=3) describing this, one Edinburgh architect said:-

> "Cleaning detracted from the presence of the building, leaving it a lifeless pile of stones."

Other sites reported, although less frequently, to have been negatively affected by stonecleaning, were the Royal College of Surgeons (N=2), Royal Scottish Academy (N=2), the Caledonian Hotel (N=1), the Post Office (N=1) and Crabbies Bond, Leith (N=1) described by an architect as:-

> "Formerly mysterious and dark, now anonymous bland Georgian warehouse with no presence."

6% of architects said that no buildings had been negatively affected in terms of townscaping as a result of stonecleaning.

BUILDINGS IN EDINBURGH WHERE SOILING HAS ENHANCED THEIR AESTHETIC APPEAL AND ON WHICH STONECLEANING WOULD BE AESTHETICALLY DETRIMENTAL

Of those architects who replied to the questionnaire, 54% named buildings which they felt were aesthetically enhanced by soiling, and on which they felt

stonecleaning would be detrimental. Prominent amongst sites mentioned were those in the Old Town area (N=8). As one architect commented in response to this question:-

> "The Old Town (e.g. High Street, Grassmarket) where there was no set framework or urban design. This random growth allowed the use of many different building types which have become a most pleasing ad hoc composition. Unified by their antiquity, the ageing of such buildings adds to their aesthetic appeal."

Another respondent argued that the buildings forming the silhouette of the Old Town, as usually seen in shadow, from Princes Street should not be cleaned. Another architect remarked that rubble construction, prominently used in the Old Town area did not respond well to cleaning. Where cleaning had to take place the requirement was for a milder form of cleaning, e.g. brush and water.

Other buildings mentioned as aesthetically benefiting from soiling were the Sir Walter Scott Monument in Princes Street (N=7)(Plate 8.2), Edinburgh Castle (N=6), St Giles Cathedral (N=5), the Church of St John the Evangelist (N=3)(Plate 8.1) and the area of the New Town (N=5)(Plate 10.3) which forms part of Edinburgh New Town Conservation Committee where a policy of selective non-cleaning is in operation. Other sites mentioned included Parliament Square (N=2)(Plate 13.30), Old St Andrew House (N=2), New College (N=1), Highland Tollbooth Church (N=1), Nelson Monument (N=1), Heriot School (N=1), Donaldson School (N=1)(Plate8.19) and Fettes College (N=2).

Responses by architects to the question of whether soiling can enhance the aesthetic appeal of buildings clearly reveal that in their opinion this is possible.

The range of buildings and sites given by architects as examples of where they feel this occurs in Edinburgh is quite extensive, ranging from large areas of the Old and New Town to individual historic buildings. The level and nature of the soiling on these buildings varies considerably. Many of the buildings cited are lightly soiled with the colour of the underlying stone clearly visible, e.g. Donaldson School and streets in the New Town, other buildings are completely blackened with no indication of the underlying colour of the stone, e.g. St John the Evangelist Church (Plate 8.1). It would seem that some architects are of the opinion that only buildings with moderate levels of soiling are enhanced by stonecleaning, whereas others see the possibility of buildings with very heavy levels of soiling as potentially aesthetically pleasing. About 22% of architects thought that no buildings were improved by soiling. The relationship between soiling and aesthetics is explored in more detail later.

CHANGES TO THE VISUAL CHARACTER OF BUILDINGS AS A RESULT OF CLEANING

Responses to the way in which the visual character of a building change as a result of cleaning produced a range of responses. The most commented on positive change in visual character resulting from stonecleaning was the restoration and clarification of architectural detailing which emerge from the previously blackened facades. Stonecleaning was also seen to restore the colour of the stone and significantly lighten and brighten the facade, increasing the amount of reflected light from cleaned buildings. These effects were seen to help reveal the original architects intentions. As one architect reported:-

> "The (cleaned) building looks brighter and lighter. As a result the rich detailing and general design of the building is more noticeable and more like its original self in terms of a design on paper and as newly built."

Cleaning was seen to have other benefits with regard to the change in the effect of light on the building. In particular shadowing effects are altered as a result of stonecleaning. One architect commenting on this aspect said:-

> "Cleaning allows much greater light and shade differentials thereby allowing the facade to be viewed as it was designed, for viewing in northern light but with a warm stone. Without cleaning the detail is lost in a grey mass."

Other positive changes in visual character reported by architects as a result of cleaning included the increased accentuation of buildings which become more sharply defined, leading to a greater appreciation of their mass. Buildings can also appear more friendly/welcoming and less forbidding. The character of buildings can be enhanced in addition to making them appear better looked after. In effect the cleaned building can become more noticeable at street level rather than appearing as a dark mass.

Architects also reported a number of negative changes to the visual character of buildings following cleaning. Included amongst these were the loss of depth and detailing, the removal of patina and damage to the fabric of the building. Another problem identified was the confusion of the buildings historical context which was seen to result from cleaning, buildings tended to look artificially young. Cleaning also tended to highlight inconsistencies on the facade, for example variations in stone colour and the effects of weathering. Just as cleaning was seen sometimes to have a positive effect on the visual character of a building, it can also have a

negative effect. Architects pointed to the shadowing effect of soiling, particularly with regard to detailing which was removed as a result of cleaning. As the response from one architect suggested:-

> "The "shadowing" of unwashed surfaces protected by projecting features is diluted though seldom completely removed by chemical cleaning. This "shadowing" can contribute to the three dimensional strength of the building."

This can also have the result of highlighting details beyond the context of the overall building form. Projections and arises often become much cleaner than background or indented forms.

In the main, architects reported the mixed effect which stonecleaning had on the visual character of buildings, change in visual character being seen as dependent on the methods employed and the way the cleaning is carried out. As one architect stated:-

> "A building is automatically revitalised by cleaning, however if it cleaned badly it can be ruined, i.e. details lost or stone bleached. Alternatively, the opposite occurs with the natural colour of stone enhancing the fine architectural detail as first envisaged by the architect."

Also as one respondents pointed out, the visual character of a building needs to be considered in the context of other surrounding buildings:-

> "Stonecleaning effects vary with the location and function each particular building holds within the urban framework."

The change in visual character of a building following stonecleaning is also dependent on other aspects of the work carried out to cleaned buildings, for example stone repairs and renewals.

EDINBURGH BUILDINGS WHICH HAVE SIGNIFICANTLY CHANGED IN CHARACTER AS A RESULT OF STONECLEANING

Architects were asked to give examples of buildings in Edinburgh which they felt had significantly changed in character as a result of cleaning. They were also asked to comment on how their aesthetic appreciation of them was altered as a result of cleaning. A wide range of buildings were commented on.

The Balmoral Hotel

This was the most frequently commented on building, perhaps because it was the latest major building in Edinburgh to have undergone stonecleaning and occupies a central position in the city. Of those who commented, approximately 75% did so favourably. The most frequent comment made concerned the delicacy of detail that had emerged from the previously soiled surface. Several architects commented on the "transformation" that had taken place, from a sombre dark building to a lighter less oppressive one. As one architect commented:-

> "The architectural quality of this building has been enhanced, sharpening the detailing and accentuating many of the aesthetic aspects of the composition."

Two architects commented on the floodlighting, one doing so positively the other negatively.

Those who commented negatively about the building did so in relation to the loss of the sense of history resulting from the cleaning and the way the building now "stands out".

The Caledonian Hotel

Architects who commented about the Caledonian Hotel did so mainly positively. The cleaning of the building has revealed the colour of the red sandstone and this was seen by most to be aesthetically advantageous. The main negative comment concerned the indenting which had been made following cleaning. This had resulted in a patchy appearance and was seen as aesthetically detrimental. One architect thought the cleaning of this building had disrupted the balance of the west end of the city by,

> "the abrupt reintroduction of a gigantic and ornate red mass"

but the majority seemed to see the cleaning more in terms of a restored landmark.

The Usher Hall

Architects who commented about the Usher Hall were evenly divided between those whose aesthetic appreciation of the building had improved and those who

felt the building had aesthetically suffered, as a result of cleaning. Architects who preferred the cleaned facade commented about it being a more attractive building which revealed details and was a good example of a careful restoration. Those who commented about it negatively remarked on its bleached look and the "phoney" and "unreal" look of the facade. Another commented:-

> "I became aware of the simplicity of the Edwardian design, but saddened when the stone detailing was examined closely. The patina of age has been sacrificed for visual impact."

Royal Scottish Academy and National Gallery

As was the case with the Usher Hall attitudes about the aesthetic effect of cleaning on these two buildings was divided. Those who commented favourably said the buildings had visually improved, revealing details and showing how they had been originally conceived by Playfair who had designed the buildings. Those who commented negatively referred to the stones used for the RSA coming from a number of different quarries and that stonecleaning had revealed their different colours and textures particularly on the columns, giving them a "bizarre" appearance. Also commented on was the irreversible damage done to the buildings as a result of sandblasting and disc grinding. In addition, where the National Gallery had been patched in the past with lampblack to match the previously soiled appearance, these repairs were now clearly visible.

The Balmoral hotel, the Usher hall, the Caledonian hotel and the galleries on the Mound were the most frequently reviewed buildings. Other buildings commented on but to a lesser extent included:-

Pilrig Church, Tollcross

The cleaning of this building was commented on favourably in terms of it being visually more pleasant, and how following cleaning it became more noticeable in its townscape context.

1-4 Doune Terrace

Three architects commented on the cleaning of this part of Doune Terrace. Two argued that cleaning had disrupted the balance of the whole terrace, staining and bleaching had been revealed and the original pleasing silvery grey patina had been removed. The third architect felt that the result was "first class" and recommended that the rest of the terrace be similarly washed.

Atholl Crescent

Those architects who commented on Atholl Crescent did so positively, emphasising its perceived success being due to it being cleaned as a single unit. Awareness of the Crescent was also seen to have increased following cleaning.

ETHICAL ISSUES INVOLVED IN ATTEMPTING TO MAKE AN OLD BUILDING LOOK THE WAY IT DID WHEN FIRST CONSTRUCTED

Responses to this question raised a range of different issues. The majority (75%) were broadly of the opinion that there were no ethical issues involved in cleaning

although a number qualified their answers. These qualifications revolved around issues such as ensuring that the building is not damaged and that no attempts are made to improve on the original design. Provided judgments were made on a case by case basis and the urban context was enhanced, these architects felt that ethical issues were not involved.

Architects who felt that there were ethical considerations involved in stonecleaning pointed to a number of concerns. These included the false impression of age given by cleaned buildings and the sense that in some way stonecleaning took away from the history of the building and diluted architectural heritage. Some architects pointed out that cleaning does not restore buildings to their original state. The other main ethical concern was the damage done to the fabric of the building by cleaning. As one architect said:-

> "Buildings should be allowed to weather to a stable state, cleaning damages the stable state. With acid cleaning there is no means of ensuring penetrating acid has been neutralised."

A number of architects felt the issue was a complex one. Some argued for the need to remove soiling but not the natural weathering. As one architect involved in conservation commented:-

> "If stone can be cleaned without any physical degradation, it is reasonable to try to restore a building to its original condition and appearance. The problem is that the imprint of time is inevitable and should not be removed unless it is weakening the material or structure."

A few respondents drew the distinction between removal of soiling by water washing for example, and cleaning which goes beyond this and removes the patina

and natural weathering. Other ethical questions raised involved disturbance of the integrity of the landscape and the long term effects of cleaning. A number of respondents made reference to looking at the original intentions of the architect and trying to maintain these values within the townscape. As one architect said:-

> "We have to strive to maintain the unity of design and aesthetic within and between compositions."

ARCHITECTS GENERAL DISPOSITION TOWARD RETURNING OLD BUILDINGS TO THEIR ORIGINAL APPEARANCE BY STONECLEANING

Approximately 60% of architects responded that they were generally in favour of attempts made to return old buildings to their original appearance, 28% were against with the remainder being unsure. A number qualified their answers with statements about this being subject to damage not being done to buildings, cleaning being undertaken by trained operatives and leaving signs of aging which will add to the character of the building.

AESTHETIC PROBLEMS RESULTING FROM STONECLEANING

Architects were asked to comment on the extent of the aesthetic effect of problems resulting from stonecleaning. Responses (Figure 12.1) to four areas in particular were sought :-

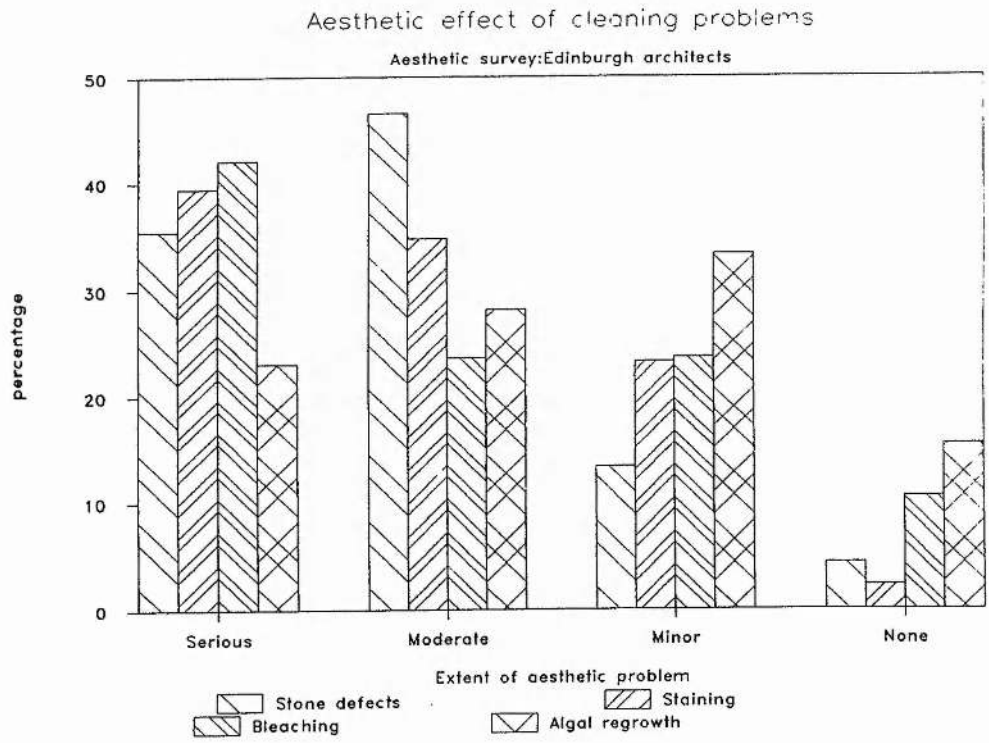
-Exposure of stone defects

-Staining

-Bleaching

-Algal re-growth

Figure 12.1 Architects opinions on the extent of the aesthetic effect of commonly identified problems of stonecleaned buildings.



Exposure of stone defects

Approximately 47% of architects regarded the aesthetic problem of the exposure of stone defects as moderate, in buildings where this occured, with 35.5% regarding them as serious. Sites mentioned as aesthetically suffering as a result of the exposure of stone defects included Melville Street, Wemyss Place, the Caledonian hotel, the Royal College of Surgeons building, the Royal Scottish Academy, the National Library extension and tenement areas in Tollcross and Leith. Some architects pointed out that stone defects were normally corrected as part of the refurbishment, but that finance was not always available to complete or adequately attend to the problem. As one architect stated:-

> "The most inconsistent attitude to cleaning, after initial decision making, is level of funding to repair/conceal worst features of the process. Stonecleaning also tends to highlight where sign fixings have been, and this can be aesthetically displeasing."

Staining

The problem of the aesthetic effects of staining as a result of cleaning is complex. Staining is a natural tendency, even for freshly quarried stone, and weathering is likely to exacerbate this. It is often the case that soiling obscures the staining, which subsequent cleaning reveals. This is different from staining which results directly from cleaning which, as architects pointed out, is mainly a problem with chemical cleaning. Staining also varies, some can be attributed to iron migrating to the surface, other stains are caused by the effects of water particularly in relation to faulty guttering, etc.

Whether caused by the cleaning process or merely revealed by it, a high proportion (39.5%) thought the problem aesthetically serious where it existed, with a further 34.8% describing it as moderate. Some architects commented that staining tended to tone down over time. An example of this was Edinburgh Wax Museum where very bad staining had occurred below a projecting cornice which has since mellowed.

In some cases architects reported that staining was so heavy it had necessitated the replacement of stone as for example in St. Stephen Street. Other sites where staining had been an aesthetic problem included Melville Street, Melville Crescent, Methodist Hall Tollcross, Wemyss Place, Register House, Queen Street, Walker Street, Hamilton Place, the Church of St John The Evangelist, Register House and Holyrood House. As one architect pointed out, examples of aesthetically detrimental staining can be seen throughout Edinburgh.

Bleaching

Of all the visual and aesthetic problems which may occur due to stonecleaning, bleaching was seen to be the most serious in those buildings which suffered from the problem. Architects pointed out that bleaching usually occurred with chemical cleaning, where strong acids or prolonged applications had been used in an attempt to remove soiling. Architects commented on the "unnatural and lifeless" grey colour produced on some bleached sandstones. This was often hard to detect from sample panels or small test areas which are cleaned prior to full scale stonecleaning. Sites where bleaching had occurred included Melville Street, Haddington Place, Cockburn Street, Morrison Street, Lauriston Place, Rutland Square and the Methodist Hall Tollcross.

Algal re-growth

Algal re-growth was seen as the least aesthetically serious problem caused by stonecleaning in those buildings where this occurred. As with staining it may well be that cleaning simply exposes, and makes more visually apparent the algae which is already present. There is at present no firm evidence that cleaned facades produce more rapid rates of algal growth than soiled facades, although some of the constituents of chemical cleaners might encourage algal growth. Architects commented that north facing elevations were the most affected, and there was some suggestion that the problem was greater on newer buildings. Buildings in Dundas Street and the Bank of Scotland on the Mound were seen as sites where algal re-growth was aesthetically detrimental.

INDENTED STONES IN FACADES

The question of indentation of new stone in soiled facades and whether this necessitates the cleaning of these facades is often raised in connection with stonecleaning.

Architects were asked whether the insertion of new stone as indents generally necessitated the cleaning of the whole facade. The majority of Edinburgh architects (63%) thought that this was generally not necessary. A total of 30% of architects thought that in every circumstance new stone indented in old buildings was visually acceptable. Some commented on that indents blended in relatively

quickly. An example of this is at the corner of Howe Street and Heriot Row where the gable end was extensively indented 15 years ago but has since blended in.

One architect pointed out that it was common practice to indent historic buildings without cleaning the whole facade. However the majority thought circumstances varied as to when indentation was visually acceptable. Situations where the old stone was not badly soiled, or where there was little colour variation between original stonework and indents, or where the original stonework is patchy and of different stone type were seen as situations where the whole facade need not be cleaned. Some architects argued that it depended on the proportion of indents to original stone, figures of between 10%-30% were quoted by some as being an acceptable level of indentation. The nature of the architectural feature being indented was also seen to be a factor in their acceptability. Where single definitive elements, for example string courses, dressings, mouldings or rybats were being indented these were seen as more acceptable. One architect commented:-

> "Where the new stone does not disrupt the aesthetic of the facade, specific elements should be replaced in their entirety to maintain the unity of form, symmetry etc."

The position and visibility of indents was also mentioned. Indentation to rear elevations or minor buildings was seen by some as less problematic.

Where indentation was seen as problematic by the majority of respondents, were where there was a high degree of new stone repairs which were very obvious and produced a piebald effect. In general, situations where the rhythm of the facade was seen to be disrupted by the indents. As one architect commented:-

> "Where the new stone disrupts the elemental composition or is juxtaposed in such a way that it detracts from the appreciation of the form of the facade."

30% of architects argued that there were no circumstances where indentation was unacceptable. One commented that new stone indents could be toned down by, for example, covering the stone with sludge from guttering. Sites in Edinburgh where indentation had been seen to be aesthetically problematic included areas of the New Town, Tollcross Tenements (upgraded but not cleaned), National Gallery of Scotland, Gardners Crescent, Adelphi Grove, Ainslie Place, Broughton Street, St. Vincent Street and Lister Housing Association, Lauriston Place.

PARTIAL CLEANING OF TERRACES

In addition to the cleaning of individual free standing buildings, much of the stonecleaning work in urban areas involves the cleaning of individual facades in terraces. Architects were asked whether they were in favour of owners being permitted to clean individual facades in terraces. A clear majority (63%) were against this practice. The main reason for this was its effect on the townscape and the disturbance of the appreciation of the urban design. As one architect commented:-

> "In terraces the uniformity of the street is a major element in the design. With partial cleaning the unity of the composition is disrupted."

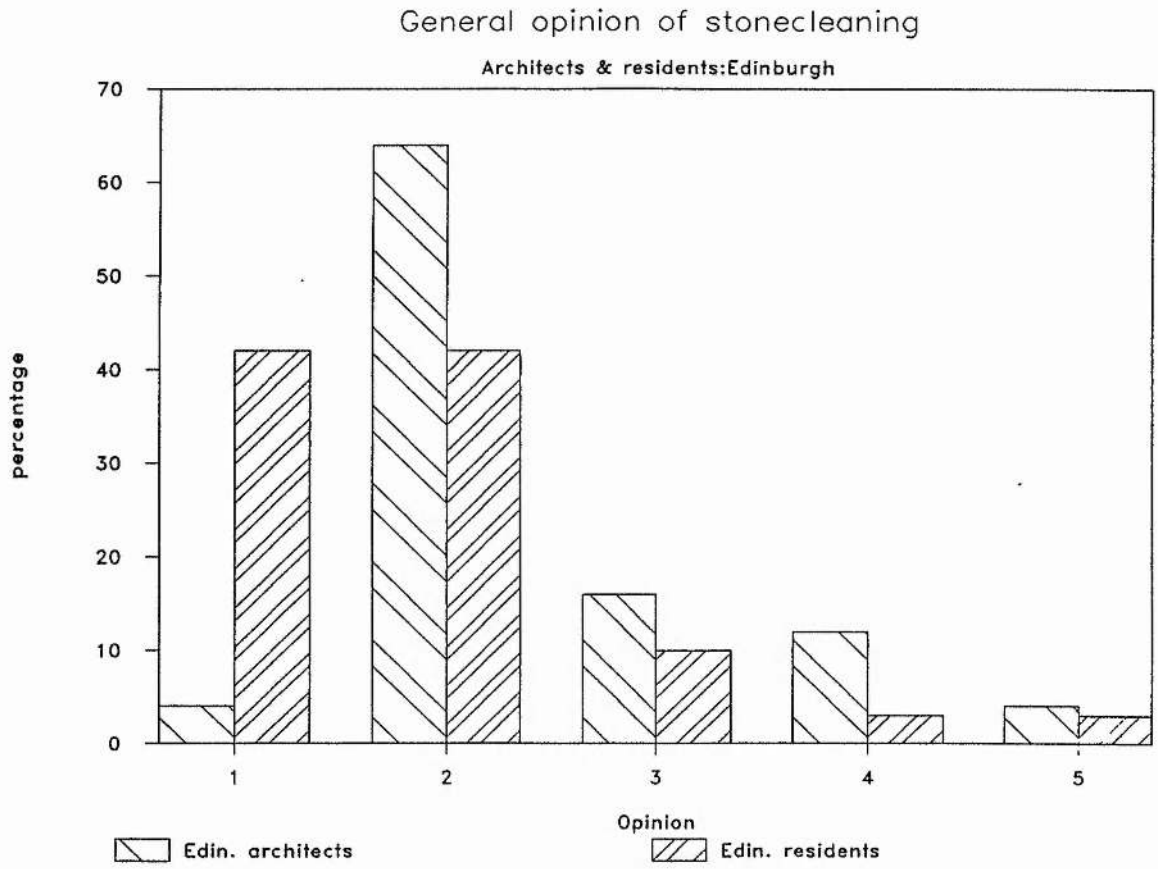
Another pointed out that cleaning with different methods or over a long time span produces visually detrimental effects. Partial cleaning was seen to be less

disruptive in areas such as the Old Town, where terraces were not designed as single units. Those architects (24%) who favoured individual owners being permitted to clean their own facades, commented that if it was part of a broad strategy, individual cleaning should be permitted. Some commented that getting all owners to agree at the one time is problematic. Another argument involved owners rights to clean if they wished. 13% of architects were undecided about the issue. A similar majority of architects (63%) were also of the view that leaving terraces in their original condition was better than them being partially cleaned, with 19% taking the opposite view. The results from this question show a clear discrepancy between the views of architects, and those of residents surveyed (Chapter 10) who, although not liking the visual effect of partial cleaning, were generally in favour of owners being permitted to clean and felt that some cleaning was more beneficial than no cleaning at all.

EFFECTS OF STONECLEANING ON EDINBURGH

Figure 12.2 gives architects overall view of the effect of stonecleaning in Edinburgh, along with responses from the on-site survey of Edinburgh residents. Results show the range of opinion amongst Edinburgh architects, with the majority indicating that stonecleaning has been largely for the better, but a significant minority feeling the effect has been for the worse. In comparison to residents, architects tend to be more cautious in their view of the effects of stonecleaning in Edinburgh.

Figure 12.2 Architects general views on the effects of stonecleaning in Edinburgh.



OVERALL FAVOURABILITY TOWARDS STONECLEANING

A final question asked of architects was whether or not they were generally in favour of stonecleaning. Responses revealed that 76% were generally in favour of stonecleaning, with 24% being opposed. Several architects who were generally in favour took the opportunity to qualify their answers. The qualifications raised mainly concerned the lack of understanding about stonecleaning, the need for skilled practitioners, the use of appropriate methods and the effects of cleaning on the stone itself.

OTHER ISSUES RAISED BY ARCHITECTS

Architects also took the opportunity to make points in addition to those set out in the questionnaire. A wide range of different issues were raised by individual architects. These included:-

1. Stonecleaning was recognised as a complex subject. Failures were often due to contracts being undertaken by inexperienced firms. There were inherent dangers in the use of competitive tendering for stonecleaning work. Work has to be carefully specified and controlled, and care has to be taken to choose firms of proven ability. The question of the possibility of accreditation of stonecleaning firms was also raised.

2. The responses of different stone types to cleaning. Stonecleaning of rubblework was thought by some to be less detrimental than on ashlar or fine detail.

3. The need for a clear planning policy for stonecleaning. There was inconsistent advice, practice and control from the various funding bodies. Stonecleaning should always require planning permission, and should be discouraged in areas of uniform townscape, e.g. parts of Edinburgh New Town. Some architects felt stonecleaning needs positive justification, and that there should be a general presumption against stonecleaning.

4. Stonecleaning was often more successful in tenement suburbs (where it gave a morale boost) and single public buildings. It can be a disaster in palace facades.

5. The removal of the natural patina was counterproductive in terms of the ability of stone to resist decay. Chemical cleaning accelerated weathering and produced a whiter colour than the natural stone colour. Very careful physical cleaning may turn out to be less dangerous and produce more pleasing, durable results than chemical cleaning, though at considerably greater cost. It may be better to clean fewer buildings with much greater care.

6. The term "stonecleaning" needs to be redefined by the term "stone-washing", or some other term without the word "clean" associated with it. Perhaps cleaning should be restricted to a low-tech washing method.

7. Advice on stonecleaning is needed in terms of an analysis of historical context of buildings, streetscape, quality of stone and scientific testing.

8. The study of stonecleaning will not be complete unless it records the speed of soiling of cleaned buildings. Buildings on main thoroughfares such as the

Caledonian Hotel on Lothian Road or the National Gallery and Royal Scottish Academy on the Mound which have been cleaned within the past 10-20 years are now soiled.

9. Those opposed to stonecleaning argue that cleaning is only temporary, is potentially damaging and involves the expenditure of large sums of money for superficial gains.

10. There were environmental concerns about the way in which effluent from stonecleaning was disposed.

11. Some terraces such as Atholl Crescent were built over a few years, others such as Melville Street and parts of the Moray Estate took 50 years to complete. Those built over a long time span are likely to contain stones from different quarries or from different parts of the same quarry and variations in colour and texture should be anticipated and taken into consideration when listed building consent to cleaning is being given.

DISCUSSION

The results from the aesthetic survey of architects illustrate the divergent views on stonecleaning within the profession. The majority of architects are largely in favour of stonecleaning, but have reservations on visual, aesthetic, physical and townscaping grounds. A small percentage of architects remain totally opposed to any form of stonecleaning.

Stonecleaning was generally seen to be most successful in tenement areas where a coordinated strategy was adopted, and where large free standing buildings were cleaned with adequate resources, using appropriate methods. Cleaning isolated facades in terraces was counterproductive and has had aesthetically detrimental results (e.g. Rutland Square). Areas of Edinburgh with palace facades which had uniformly moderate soiling (e.g. in the New Town and Moray Estate), were seen by many as aesthetically pleasing.

Concern was raised at the aesthetic damage done by stonecleaning, particularly with regard to the bleaching and staining of stone.

The need for an overall planning policy for the city was evident. Inconsistent policies, poor specification, lack of knowledge and poor workmanship of cleaning contractors had led to examples of bad cleaning. Clearly the various stonecleaning techniques were seen to differ considerably in the aesthetic effects produced. Architects made a distinction between those techniques which attempted to remove surface soiling only (e.g. low pressure water washing, low pressure blasting) while leaving intact the patina and more ingrained soiling, and techniques which aimed at more complete removal of soiling (e.g. chemical cleaning) which had potentially greater adverse effects on the stone. The term stonecleaning covers a wide variety of techniques from very mild to aggressive techniques, perhaps greater differentiation is needed in terms of terminology to reflect this. The survey showed that the issue of stonecleaning amongst Edinburgh architects is clearly a contentious one.

Chapter Thirteen

Aesthetic appraisal of buildings

INTRODUCTION

The study of the appraisal of buildings before and after cleaning (Chapter 9) revealed significant shifts in semantic differential evaluations following cleaning in those buildings selected for investigation. However, the buildings used in the study were mainly of ashlar construction and the pre-cleaned buildings were, in the main, heavily soiled. Evidence from the aesthetic survey of architects (chapter12) and the residents survey (chapter 10) revealed that soiling can aesthetically enhance and add to the character of some buildings. The question then arises as to which buildings are aesthetically improved by cleaning and which might be better left in a soiled condition.

The aim of the present study was to investigate more fully the relationship between architectural style and exterior finish, level and nature of soiling and the aesthetic evaluation of buildings which varied in terms of these properties. The principal objective being to ascertain under what circumstances buildings might be aesthetically enhance by soiling, and conversely when soiling had a detrimental effects on aesthetic judgements.

METHOD

Photographs of 33 buildings (Plates 13.1-13.33) which varied in terms of architectural style and exterior finish, and level and nature of soiling were selected for study. The basis of selection was to achieve, as far as possible, a reasonable cross

section of buildings which varied in terms of soiling, materials, age and style. Four sets of buildings from the before and after cleaning study (chapter 9) were also incorporated into this study. The buildings selected were:-

224 Royal Mile, Edinburgh (Plate 13.1)

3 Park Circus Place, Glasgow (Plate 13.2)

4 Magdala Crescent, Edinburgh (Plate 13.3)

40 Charlotte Square, Edinburgh (Plate 13.4)

84 Haymarket Terrace, Edinburgh (Plate 13.5)

Tolbooth Tavern, Royal Mile, Edinburgh (Plate 13.6)

Royal Bank, North Bridge/High Street, Edinburgh (Plate 13.7)

Lady Stair's House, Lady Stair's Close, Edinburgh (Plate 13.8)

Royal British Hotel, Princes Street, Edinburgh (Plate 13.9)

Boswell's Court, Castlehill, Edinburgh (Plate 13.10)

Castlehill School annex, Royal Mile, Edinburgh (Plate 13.11)

56 St. Vincent Street, Glasgow (Plate 13.12)

Argyll Arcade, Buchanan Street, Glasgow (Plate 13.13)

Castlehill School, Castlehill, Edinburgh (Plate 13.14)

5 Park Circus Place, Glasgow (Plate 13.15)

Royal Mile Mansions, Royal Mile, Edinburgh (Plate 13.16)

Tenements, Mound Place, Edinburgh (Plate 13.17)

Haymarket Terrace, Edinburgh (Plate 13.18)

3 Magdala Crescent, Edinburgh (Plate 13.19)

46 Charlotte Square, Edinburgh (Plate 13.20)

National Portrait Gallery, Queen Street, Edinburgh (Plate 13.21)

New College and Assembly Hall, Mound, Edinburgh (Plate 13.22)

Office block, Cannongate/Horse Wynd, Edinburgh (Plate 13.23)

Castlehill, The Royal Mile, Edinburgh (Plate 13.24)

Bank of Scotland, George Street, Edinburgh (Plate 13.25)

Offices, King Street / Osborne Street, Glasgow (Plate 13.26)

Patrick Geddes Hall, Ramsay Lane, Edinburgh (Plate 13.27)

Milton House School, Canongate, Edinburgh (Plate 13.28)

Donaldsons School, West Coates, Edinburgh (Plate 13.29)

Signet Library, Parliament Square, Edinburgh (Plate 13.30)

219 St Vincent Street, Glasgow (Plate 13.31)

Palace Shop, Abbey Strand, Edinburgh (Plate 13.32)

Royal High School, Regent Road, Edinburgh (Plate 13.33)

MATERIALS

The 15x10cms photographs were mounted on heavy gauge card which was folded in such a way as to enable the photograph to be stood upright. A 10x75cms sheet of paper was divided up into a 9x9 numbered grid with a large extended margin along the left hand side vertical axis on which the photographs could be placed without entering the grid itself. The margin was labelled in the following way:-

1. No soiling

2.

3. Light soiling

4.

5. Moderate soiling

6.

7. Heavy soiling

8.

9. Very heavy soiling

Two further scales were drawn up on pieces of card which could be attached to the top of the grid. The first was designed to measure the aesthetic pleasingness of the buildings and was labelled as follows:-

1. Aesthetically very pleasing

2.

3.

4.

5. Aesthetically moderately pleasing

6.

7.

8.

9. Aesthetically very displeasing

The second was to measure the extent to which subjects thought that the buildings would be aesthetically improved or deteriorate following cleaning. The scale was labelled as follows:-

0. Cleaning of these buildings is unnecessary as they have little or no visible soiling.

1. Cleaning the exterior of these buildings would very significantly detract from their aesthetic appearance or character.

2. Cleaning the exterior of these buildings would significantly detract from their aesthetic appearance or character.

3. Cleaning the exterior of these buildings would detract from their aesthetic appearance or character.

4. Cleaning of these buildings would possibly detract from their aesthetic appearance or character.

5. It is uncertain if cleaning the exterior of these buildings would be an improvement or detrimental to their aesthetic appearance or character.

6. Cleaning the exterior of these buildings would possibly make an improvement to their aesthetic appearance or character.

7. Cleaning the exterior of these buildings would make some improvement to their aesthetic appearance or character

8. Cleaning the exterior of these buildings would make a significant improvement to their aesthetic appearance or character

9. Cleaning the exterior of these buildings would make a very significant improvement to their aesthetic appearance or character

PROCEDURE

Subjects were presented with the grid on a large table along with the photographs. They were instructed to look at the buildings and place them in order of soiling according to the 9 point scale in the Y-axis margin. Subjects were free to move and alter the position of the buildings as they wished. When subjects indicated that they were satisfied with their sorting, the ranking of each building according to the soiling scale was noted. Once this had been completed the aesthetic scale was placed along the top of the grid. Subjects were then asked to move the photographs from their position in the margin, along the row to a position which represented how aesthetically pleasing they felt the buildings were. Again subjects were free to move the photographs as they pleased. Being able to observe all the buildings at the same time enabled subjects to make direct comparisons between buildings. When subjects were satisfied with the positions they had placed the buildings in the ratings for the buildings on this scale were noted and the photographs placed back in the margin. The aesthetic scale was then removed from the top of the grid and replaced by the aesthetic/cleaning scale. Subjects were asked to indicate what

effect they thought cleaning each of the buildings would have on their aesthetic appearance or character. This was done by moving the photographs to an appropriate place in the grid as before. Subjects who had indicated that particular buildings had none or very little soiling were given the option of leaving the photograph in the margin (0) indicating that cleaning was unnecessary. A total of forty subjects were tested.

RESULTS

Results for each of the buildings were plotted on three dimensional graphs using the Autocad computer program. These are shown in Figures 13.1 - 13.33.

Key to graphs

Red lines = Scores between 6-9 on the aesthetic/cleaning scale

Blue lines = scores between 1-4 on the aesthetic/cleaning scale

Black circles = Score of 5 on the aesthetic/cleaning scale

Green circles = Zero scores on the aesthetic/cleaning scale

224 Royal Mile, Edinburgh (Figure 13.1)

This building in the Royal Mile, Edinburgh is constructed of rock-faced sandstone. Subjects rated the soiling level of the building as relatively low (mean 3.02) and tended to rate the building towards the aesthetically pleasing end of the aesthetic scale (mean 4.12). The majority of subjects also indicated that cleaning would detract from the aesthetic appeal of the building. Results indicated that subjects

felt that this building would be the most adversely affected by cleaning of all the buildings in the study. This building represents an example of where a light degree of soiling has added to the visual complexity of the facade. This has been achieved by highlighting the contours of the rock-faced surface of the stone and producing slight variations in colour over the entire facade. The effect of this has been to add to the perceived aesthetic value of the building. The soiling is not entirely even over the facade, being heavier at street level that higher up the building. It could be argued that where the soiling is heavier, complexity has been reduced, as the rock-faced contours of the stone are less apparent. Colour and textual differentiation has also been reduced and as a result these parts of the building might be aesthetically less pleasing than other areas of the facade.

3 Park Circus Place, Glasgow (Figure 13.2)

This sandstone building is of dressed ashlar construction. Subjects have tended to rate the building as having a moderate level of soiling (mean 4.9). Ratings for aesthetic pleasingness of the building vary considerably (mean 5.02). The majority of subjects indicating that the building would be aesthetically improved by cleaning (mean 6.1). Soiling on this facade appears not to compliment or enhance any of the underlying architecture features of the building.

4 Magdala Crescent, Edinburgh (Figure 13.3)

This building of dressed ashlar construction has undergone stonecleaning. Subjects tended to rate the building low on the soiling scale (mean 2.17) and moderately aesthetically pleasing. Most were of the opinion that further cleaning was either

unnecessary or would not have a significant effect on the aesthetics of the building. Two small, but significant minority groups of subjects were of the opinion that cleaning would either improve or be detrimental to the aesthetics of the building.

40 Charlotte Square, Edinburgh (Figure 13.4)

This building of dressed ashlar construction was rated by most subjects as being heavily soiled (mean 6.73). Despite the heavy soiling the building tended to be seen as aesthetically pleasing (mean 3.9). A large majority of the subjects were of the opinion that the building would be aesthetically improved by cleaning (mean 7.02). Soiling on the building is extensive and has tended to obscure the carved ornamentation and other architectural features of the building.

84 Haymarket Terrace, Edinburgh (Figure 13.5)

This terrace of dressed ashlar construction was seen as moderately heavily soiled (mean 5.59), and of relatively low aesthetic appeal (mean 6). Most subjects were of the opinion that, aesthetically, the building would benefit from cleaning (mean 6.58).

Tolbooth Tavern, Royal Mile, Edinburgh (Figure 13.6)

This sandstone building is of snecked rubble construction. Subjects rated the building as having light to moderate levels of soiling (mean 4.2) and being aesthetically pleasing (mean 3.2). Subjects were divided about the aesthetic effect which cleaning would have on the building. The majority were of the view that this

would be detrimental. The soiling pattern on this building is not uniform. Soiling is heavier at ground level particularly around the left doorway between pavement level and the first floor. Results would seem to suggest that soiling has tended to enhance the aesthetic appeal of this building, although perhaps in parts, the soiling has become too heavy and is detrimental to its aesthetic appeal.

Royal Bank, North Bridge/High Street, Edinburgh (Figure 13.7)

The Royal Bank of Scotland building on the corner of Bridge Street and High Street was built in 1898, in Scots Renaissance style. The Bridge Street facade has a gable flanked by round towers with an aedicule at the chimney. The building has a heavily machicolated parapet, and broad canted oriels set in two-storey round arched recesses. The High Street facade has triangular-pedimented dormer windows. The building is constructed of dressed ashlar which appears at some stage to have been cleaned. Subjects rated the building as having very light soiling (mean 2.83) and the building was also seen by most to be aesthetically pleasing (mean 2.93). The majority of subjects regarded cleaning as being either unnecessary or aesthetically detrimental. Residual soiling is apparent on decorative detail on the facade and would appear, in parts, to highlight this detail.

Lady Stair's House, Lady Stair's Close, Edinburgh (Figure 13.8)

Lady Stairs's House was built originally in 1622 and extensively restored in 1897. It is constructed of a combination of dressed and rock-faced ashlar. Visible on the facade is a trefoil-pedimented oriel and stair tower joined by an elaborately corbelled wrought-iron balcony. Subjects rated the soiling level as moderate (mean

4.54) and as the most aesthetically pleasing building in the study (mean 2.27). A large proportion of the subjects were of the opinion that cleaning would be aesthetically detrimental. The minority who thought that the building would be aesthetically improved by cleaning tended to suggest that this improvement would be limited. This building would seem to be aesthetically improved by the soiling on its facade. It could be argued that soiling has tended to increase the visual complexity of the building by enhancing the contours of the rock-faced ashlar, particularly stone towards the top of the facade. Soiling is relatively heavy at ground level, this has resulted in a lowering of complexity, caused by the soiling obscuring stonework detail. The complexity of the building has been further increased by the relative cleanliness of the dressed ashlar contrasting with the soiled rock-faced ashlar. The extent to which algal growth, apparent on the oriel and balcony, contributes or detracts from the aesthetic appeal of the building is open to question.

Royal British Hotel, Princes Street, Edinburgh (Figure 13.9)

The Royal British hotel was built in 1896 and is constructed of dressed ashlar. The ground floor facade has been completely altered to make way for a shop frontage. The building has two storey bow oriels, between which is an area of carved decorative stone. Two types of dormer window are present. The building was rated by subjects as heavily soiled (mean 7.66) and aesthetically moderately pleasing (mean 6.2). A large majority of subjects were of the opinion that cleaning would have an aesthetically beneficial effect. Clearly soiling on this building is extensive and has reduced the visual complexity of the facade by obscuring the carved detail and other architectural features of the facade. Subjects' ratings of its

aesthetic value perhaps reflect the effect which the heavy soiling has had on the appearance of this building, with its relatively complex and intricate design.

Boswell's Court, Castlehill, Edinburgh (Figure 13.10)

Boswell's Court is a large tenement, built c1600, with 5 finialled dormer-heads. Three linked together and separated from the others by a later chimney. The building has moulded second and third floor string courses. The building is constructed of a combination of stone types. The ground floor has been covered with channelled stucco. Subjects tended to rated the building as moderately soiled (mean 4.95), and aesthetically moderately pleasing (mean 4.63). Ratings of the aesthetic effect which cleaning would have varied. Approximately the same proportion felt the building would be aesthetically improved as were uncertain of what the effect would be. A smaller proportion believed the effect of cleaning would be detrimental. Soiling on this building has not been entirely even. While the relatively light soiling on the upper parts of the building may be aesthetically enhancing the facade, soiling on the ground floor rendering is heavier and has been made particularly evident by water run-off markings. These markings are not consistent with any underlying architectural features and may have accounted in part for the belief in some subjects that the building would be aesthetically enhanced by cleaning.

Castlehill School Annex, Royal Mile, Edinburgh (Figure 13.11)

This building dates from the late C16 and is of rubble construction. The building was rated as lightly soiled (mean 3.54) and aesthetically pleasing (mean 4.1). While

subjects were divided as to the effect which cleaning would have, the majority felt that it would be aesthetically detrimental. The light soiling on the rubble stone of this facade would appear to have increased the contrast and visual complexity of the facade.

56 St. Vincent Street, Glasgow (Figure 13.12)

This is a red sandstone building of dressed ashlar construction. Prominent features of the building are the large three-storey decorative bay windows, which are complimented by the ornate entrance to the building. Subjects rated the building as moderately soiled (mean 4.68) and aesthetically reasonably pleasing (mean 4.2). A large majority of subjects were of the opinion that the building would be improved aesthetically by cleaning. Soiling on the facade is reasonably evenly distributed and, in parts, it is possible to see the true colour of the stone. Soiling would seem to be detrimental to the aesthetics of this building as it obscures stone colour and architectural detail.

Argyll Arcade, Buchanan Street, Glasgow (Figure 13.13)

This is an exuberant Netherlandish tenement, which features strapwork characteristic of C19 Jacobean revival architecture. The red sandstone building is constructed of dressed ashlar and features considerable decorative work. Subjects rated the building as heavily soiled (mean 7.63). There was a wide range of ratings for measures of the building's aesthetic appeal (mean 5.13), but almost total agreement that the building's aesthetic appeal would be improved by cleaning. The heavy soiling on this building has considerably masked the colour of the stone .

The building's complexity has been further reduced by the soiling obscuring architectural details. The wide range of ratings for the aesthetic appeal of the building may have been due to subjects responding to different features of the building. Those rating the building as aesthetically pleasing, perhaps responding to underlying features of the architecture, whilst those rating the building as aesthetically displeasing responding more to the effect of the soiling.

Castlehill School, Castlehill, Edinburgh (Figure 13.14)

This baronial building with red sandstone dressing was constructed in 1896. The building has six ground floor pedemented windows, and a decorative machicolated parapet. The building was rated as having light soiling (mean 2.49) and was seen as aesthetically pleasing (mean 3.29). Subjects were divided on the effects cleaning would have on the building's aesthetic appeal. Slightly more felt that the building would be adversely affected than improved. While soiling is light over most of the building and is broadly consistent with architectural features, soiling has begun to obscure detail on the parapet and gable.

5 Park Circus Place, Glasgow (Figure 13.15)

This dressed ashlar building has recently been stonecleaned. Subjects indicated that the building had no soiling (mean 1.05), and tended to be seen as aesthetically pleasing (mean 2.63). Further cleaning was seen as unnecessary.

Royal Mile Mansions, Royal Mile, Edinburgh (Figure 13.16)

This Franco-Scottish tenement features a mixture of different styles. The building is constructed of a mixture of dressed and rock-faced ashlar. Soiling is more evident on the rock-faced ashlar, increasing the contrast between the two types of stone. The building was seen to have light soiling (mean 3.39) and to be aesthetically pleasing (mean 3.32). Subjects were divided on the effects which cleaning would have on the building, the majority arguing that the effect would be beneficial, but a significant minority thought it would be detrimental.

Tenements, Mound Place, Edinburgh (Figure 13.17)

These tenements are of rubble construction, built in C18, with pedemented dormer windows added in C19. Subjects rated them as lightly soiled (mean 2.81) and aesthetically pleasing (mean 4.34). Subjects were mainly of the view that cleaning was unnecessary or would be aesthetically detrimental.

Haymarket Terrace, Edinburgh (Figure 13.18)

These tenement properties with ground floor shops are of dressed ashlar construction and have undergone cleaning. The tenements have pairs of canted bay and dormer windows flanking the symmetrical facade. Subjects rated the building as having little or no soiling (mean 1.32), with a range of opinion on the buildings aesthetic appeal (mean 5.66). Subjects indicated that cleaning was unnecessary.

3 Magdala Crescent, Edinburgh (Figure 13.19)

Number 3 Magdala Crescent built c1869-76 is of dressed ashlar construction, with two-storey canted bay windows and arched dormers. Subjects rated the building as moderately soiled (mean 5.32) and aesthetically moderately pleasing (mean 4.98). Most subjects were of the opinion that cleaning would aesthetically improve the building. The nature of the soiling would not seem to be aesthetically adding to the building.

46 Charlotte Square, Edinburgh (Figure 13.20)

This dressed ashlar building has undergone stonecleaning sometime in the past and was rated by subjects as having light soiling (mean 1.95). It was seen as aesthetically very pleasing (mean 2.37). Most subjects thought that cleaning was either unnecessary or would be aesthetically detrimental. Soiling on this building appears to highlight the decorative carving on the facade.

National Portrait Gallery, Queen Street, Edinburgh (Figure 13.21)

This Venetian gothic palace was built in 1885-90 of dressed orangey-red sandstone, and has a mixture of architectural styles. The building was rated as lightly to moderately soiled (mean 4.15) and aesthetically pleasing. Subjects were fairly evenly divided as to whether cleaning would be aesthetically beneficial or detrimental.

New College and Assembly Hall, Mound, Edinburgh (Figure 13.22)

This Playfair designed building dates from 1845-50. It has a Tudor style front with towers of dressed ashlar contrasting with the stugged ashlar of the main walling. Subjects rated the building as heavily soiled (mean 7.81) and aesthetically pleasing (mean 3.46). Most subjects were of the opinion that the building would be aesthetically improved by cleaning. Soiling has tended to reduced the contrast between the different types of stone on the facade.

Office block, Cannongate/Horse Wynd, Edinburgh (Figure 13.23)

This rather bland harled office block dates from 1971. Subjects rated the building as heavily soiled (mean 7) and aesthetically very displeasing (mean 8.32). Subjects comments on his building tended to be of the view either that cleaning could only improve the look of an already aesthetically poor building or that cleaning the facade would make no aesthetic difference. The building serves to show the different effect which soiling on a modern harled building has in comparison to many of the other buildings in this study. It is difficult to see how soiling can in any way aesthetically enhance the architecture of a building of this type.

Castlehill, The Royal Mile, Edinburgh (Figure 13.24)

This dressed ashlar facade is at the junction of Castlehill and Lawnmarket. Subjects rated the building as moderately soiled (mean 5.51) and aesthetically pleasing (mean 4.07). Subjects were evenly divided between those who felt cleaning would be aesthetically beneficial and those who felt it would be detrimental. This

difference of opinion can in part be explained by the nature of the soiling on the facade. On sections of the facade (central and upper areas) soiling has had an interesting aesthetic effect by highlighting individual stones on the facade, thus increasing the building's complexity and perhaps adding to the character of the building. However, on other sections of the building the accumulation of soiling has become more extensive and this effect has been lost, thus visual complexity has been reduced and as a result these parts of the building are perhaps not as aesthetically pleasing.

Bank of Scotland, George Street, Edinburgh (Figure 13.25)

This four-storey dressed ashlar building dates from 1905. It features mullioned and transomed windows which curve into Fedrick Street. Subjects rated the building as moderately soiled (mean 4.27) and aesthetically moderately pleasing (mean 5.9). The majority of subjects thought that the building would be improved by cleaning. This result may have been influenced by the cleaning which has taken place on the ground floor facade.

Offices, King Street / Osborne Street, Glasgow (Figure 13.26)

This is a five-storey red sandstone office block with ground floor shops. Subjects rated the building as moderately soiled (mean 5.12) and aesthetically only moderately pleasing (mean 5.9). Most subjects were of the opinion that the building would be aesthetically improved by cleaning.

Patrick Geddes Hall, Ramsay Lane, Edinburgh (Figure 13.27)

This sandstone five-storey building dates from c1850. The building was rated as lightly soiled (mean 4.27) and aesthetically pleasing (mean 3.95). Subjects were fairly evenly divided between those who believed the building would be aesthetically improved by cleaning, those who believed it would be adversely affected, and those uncertain of the aesthetic effects of cleaning.

Milton House School, Canongate, Edinburgh (Figure 13.28)

This red sandstone dressed building dating from 1886 has a crowstepped gable. The building was rated by subjects as being heavily soiled (mean 6.15) and aesthetically moderately pleasing (mean 4.83). Almost all subjects were of the opinion that cleaning would be aesthetically beneficial. Soiling on this building would seem to have gone beyond the point of any aesthetic enhancement, and would appears to mask architectural detailing.

Donaldsons School, West Coates, Edinburgh (Figure 13.29)

This Jacobethan palace by Playfair dates from 1841-51. The building is constructed of lightly stugged sandstone. The central tower has domed octagonal turrets. The corner towers are finished with square ogee-roofed turrets and bay windows. The building was rated as moderately soiled (mean 5.46) and aesthetically very pleasing (mean 2.39). Subjects were sharply divided on the possible effects of cleaning. While the majority were of the opinion that cleaning would be

aesthetically beneficial, a significant minority thought that cleaning would be very detrimental.

Signet Library, Parliament Square, Edinburgh (Figure 13.30)

The Signet Library in Parliament Square is a three-storey building and has a ground floor with deep over-arched windows. The building also features Ionic columns, pedimented first floor windows and panelled parapet. Subjects rated the building as moderately soiled (mean 4.85) and generally aesthetically pleasing (mean 4). Most subjects argued some aesthetic improvement would be brought about by cleaning.

219 St Vincent Street, Glasgow (Figure 13.31)

This is a three-storey dressed ashlar building with Tuscan entrances. The building was rated as heavily soiled (mean 8.07) and aesthetically displeasing (mean 6.37). Most subjects argued that cleaning would make a significant improvement to the building. Soiling on this building has almost totally obscured the colour of the stone and architectural details, reducing the complexity of the facade.

Palace Shop, Abbey Strand, Edinburgh (Figure 13.32)

This two-storey building dates from the early C17 and has three unequal crowstepped gables which have been harled. The building was rated as moderately heavily soiled (mean 6.12) and as aesthetically pleasing (mean 3.98). Subjects were divided on the question of the aesthetics of cleaning the building,

approximately the same number suggesting cleaning would be an aesthetic improvement as those arguing that it would be detrimental.

Royal High School, Regent Road, Edinburgh (Figure 13.33)

This Greek revival building dates from c1825-9. At the base is a long retaining wall with, at the centre, two pedimented gateways. Two smaller gateways are back set on top of these and the wall on this upper level forms the base of the main massive temple. Subjects rated the building as being heavily soiled (mean 8.27). Ratings for aesthetic value (mean 5.12) fell into two distinct groups, one group rating the building as aesthetically pleasing, the other as aesthetically displeasing. This difference between ratings for aesthetic value may in part be explained by the subjects responding to different aspects of the building's visual appearance. Subjects rating the building as aesthetically pleasing perhaps responding mainly to the architectural features of the building. Those rating it as aesthetically displeasing responding more to the visual impact of the soiling. A large majority of subjects indicated that the building would be aesthetically improved by cleaning. Soiling on this building appears to be having a negative influence on aesthetic appeal.

DISCUSSION

This study illustrates the complex interaction between soiling, architecture and aesthetics. While the study of the appraisal of buildings before and after cleaning (chapter 9) revealed significant shifts in semantic differential evaluations following the cleaning of heavily soiled buildings, the present study shows that

soiling would appear to enhance the aesthetics of buildings in some circumstances. Results from this study would seem to confirm the potential aesthetic improvement brought about by the cleaning of heavily soiled buildings. Wilcoxon tests were carried out on the ratings of aesthetic value of the four pairs of buildings included in this study, which were also used in the study of buildings before and after cleaning. These buildings were:-

5 Park Circus Place (mean aesthetic value 2.63)

3 Park Circus Place (mean aesthetic value 5.02) Wilcoxon Stat. P=0.00**

46 Charlotte Square (mean aesthetic value 2.37)

40 Charlotte Square (mean aesthetic value 3.90) Wilcoxon Stat. P=0.002**

74 Haymarket Terrace (mean aesthetic value 5.66)

84 Haymarket Terrace (mean aesthetic value 6.00) Wilcoxon Stat. P=0.195

4 Magdala Crescent (mean aesthetic value 4.78)

3 Magdala Crescent (mean aesthetic value 4.98) Wilcoxon Stat. P=957

** Significant at P<0.01

Results from Park Circus Place and Charlotte Square indicate a significant improvement in ratings for aesthetic value following cleaning. Results from Haymarket Terrace and Magdala Crescent were not significant. The very small difference found between the aesthetic values of the two buildings in Magdala Crescent is consistent with the findings from the previous study, which showed

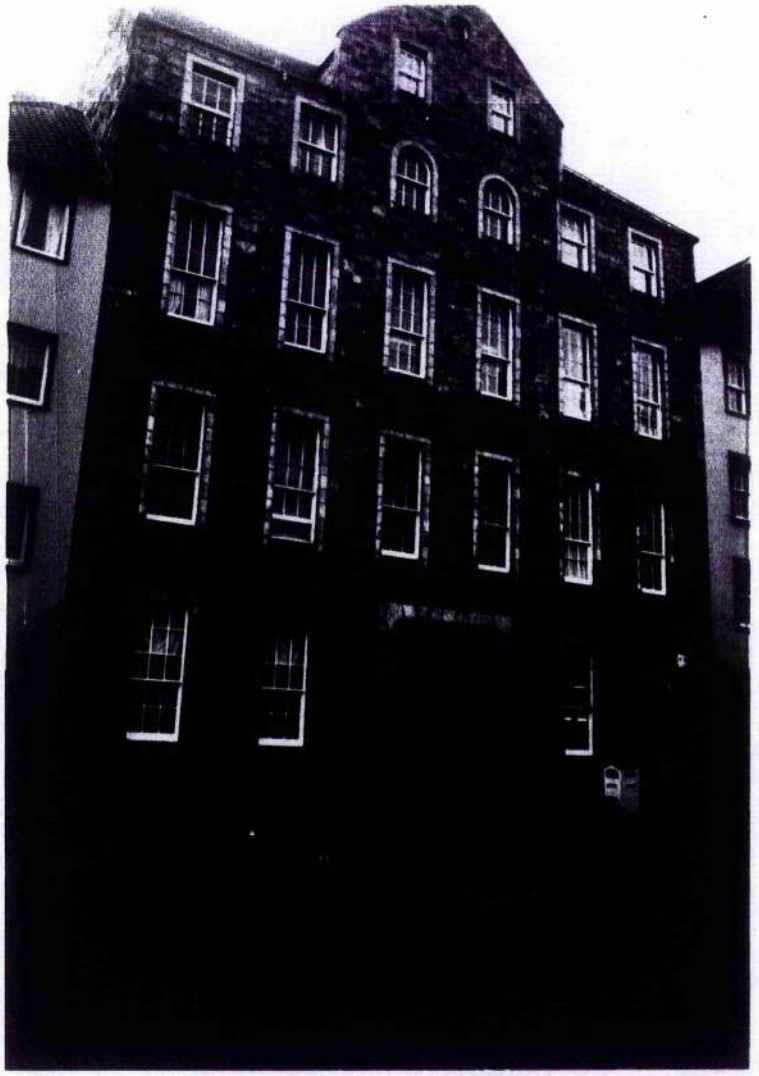
only small differences between semantic differential evaluations of the two buildings, due probably to the poor quality of the finish of the cleaned building.

Results from the present study also show that where soiling is perceived to be heavy, most subjects were agreed that cleaning would improve the aesthetic appeal of the building, e.g. Royal British Hotel (Plate 13.9), Argyle Arcade (Plate 13.13), 219 St. Vincent Street (Plate 13.31). Some buildings, which were rated as heavily soiled, none the less were seen as aesthetically pleasing, e.g. New College and Assembly Hall (Plate 13.22). Aesthetic judgments of the heavily soiled buildings, Royal British Hotel (Plate 13.9), Argyle Arcade (Plate 13.13) and Royal High School (Plate 13.33) produced interesting results in that subjects varied considerably in their judgments of the aesthetics of the buildings. It may be that some subjects tended to pay relatively little attention to the soiled surface layer and respond at a 'deeper' level, to the underlying architectural features of the building, and thus rate them as aesthetically pleasing. Others may have responded at a 'surface' level, and, on seeing the buildings heavily soiled, rated the buildings as aesthetically displeasing, without tending to look closer at the underlying architecture. Evidence already discussed in this and in the appraisal before an after cleaning study, show how aesthetic value can be increased by cleaning. Other alternative explanations are possible, it may be simply that the architectural style of these buildings are aesthetically more pleasing to some individuals.

Results from those buildings which display light and moderate levels of soiling also produced interesting results, particularly where subjects were of the opinion that cleaning would be detrimental to the look of the building. Buildings which

were in this category included 244 Royal Mile (Plate 13.1), Tolbooth Tavern (Plate 13.6), Lady Stair's House (Plate 13.8), Castlehill School Annexe (Plate 13.11), Castlehill School (Plate 13.14), Tenement, Mound Place (Place 13.17) and 46 Charlotte Square (Plate 13.20). Although there are clearly individual differences in judgment, these appears be situations in which soiling would seem to possibly enhance the aesthetic appeal of particular buildings. The theoretical relationship between soiling and aesthetics is discussed in chapter 14.

Plate 13.1 224 Royal Mile, Edinburgh.



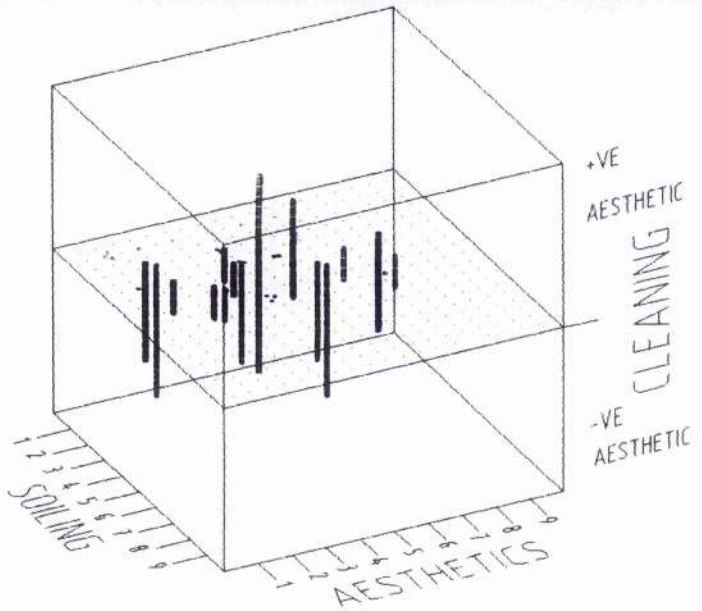


Plate 13.2 3 Park Circus Place, Glasgow.

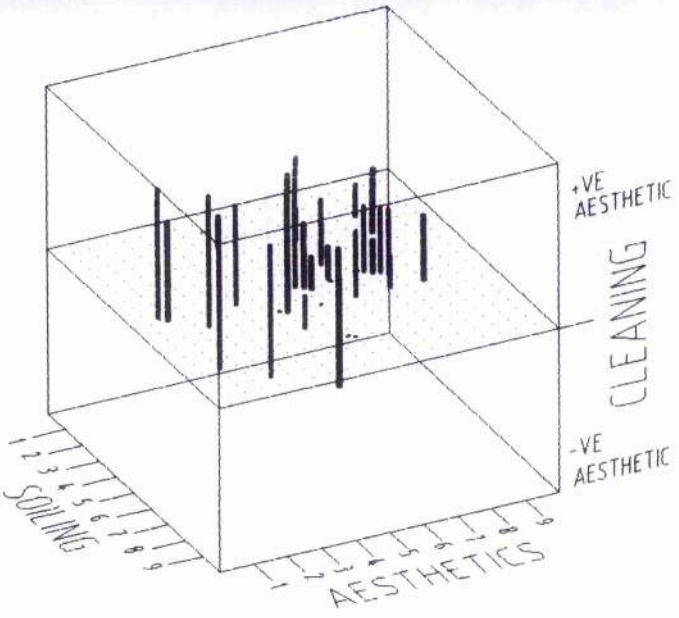


Plate 13.3 4 Magdala Crescent, Edinburgh.

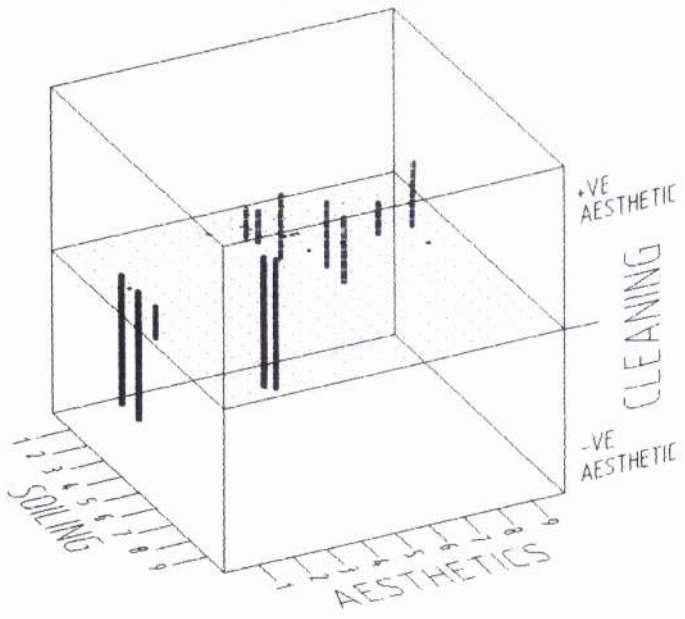
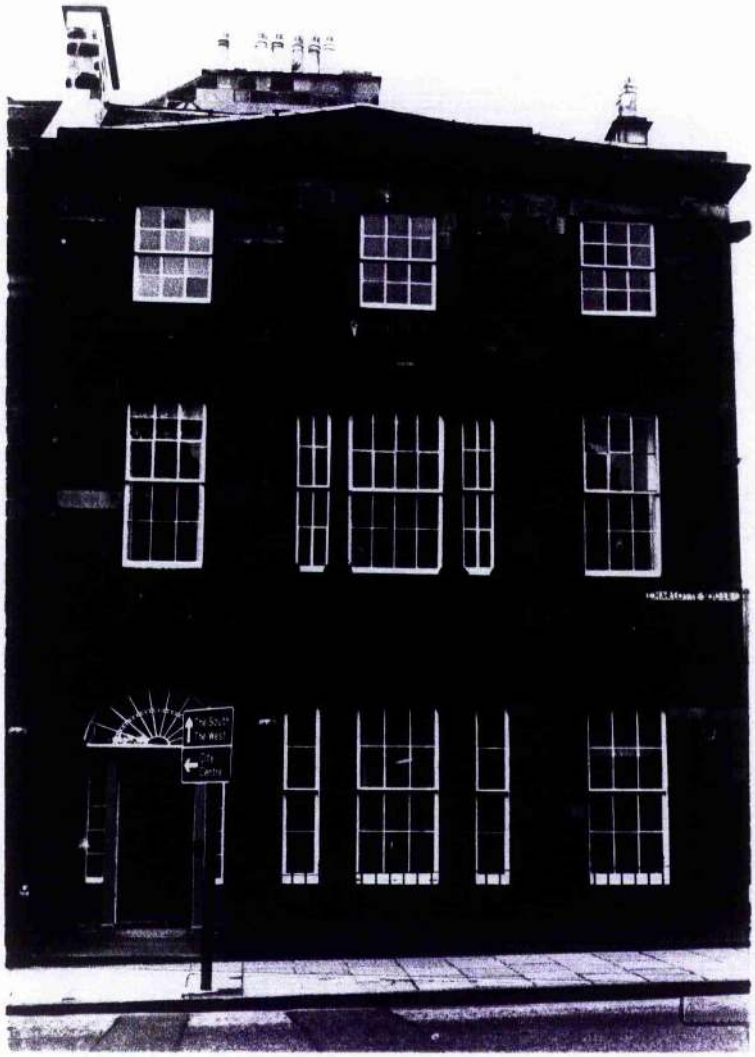


Plate 13.4 40 Charlotte Square, Edinburgh.



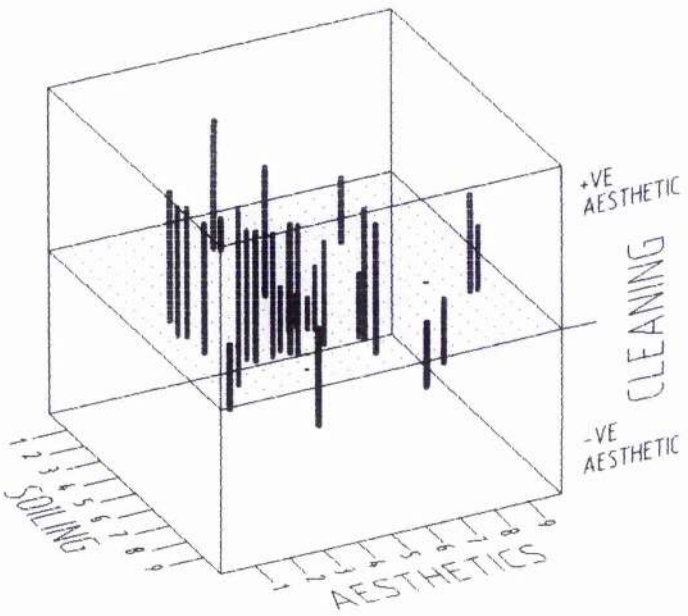


Plate 13.5 84 Haymarket Terrace, Edinburgh.

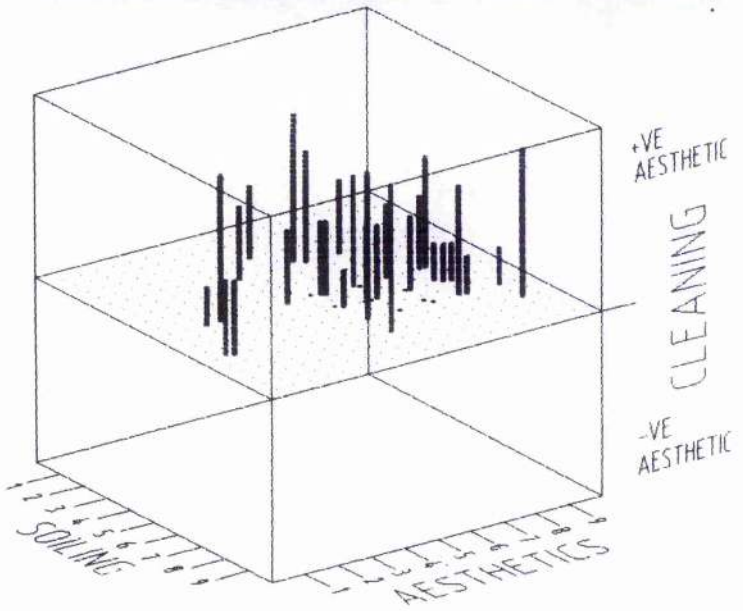
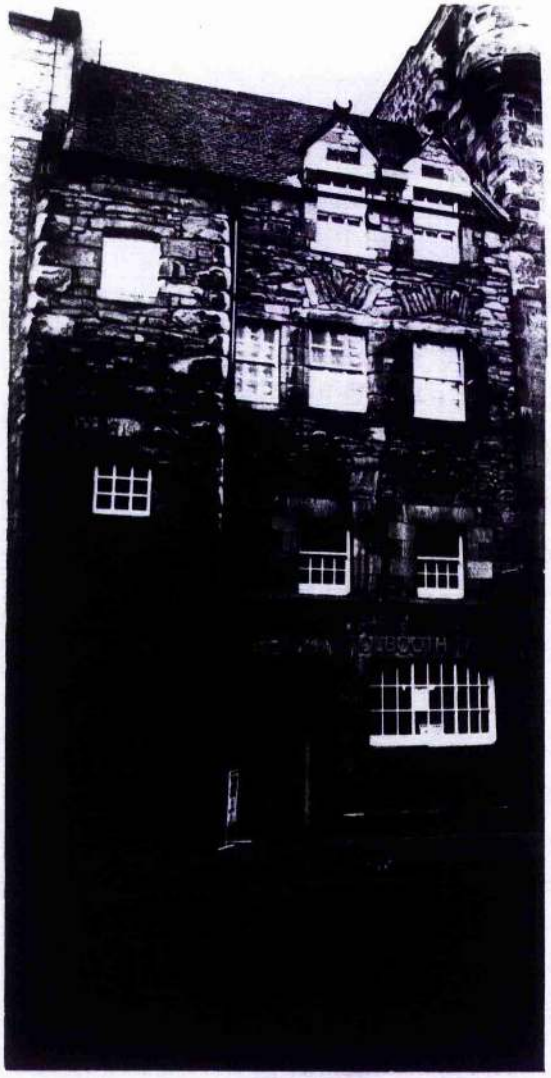


Plate 13.6 Tolbooth Tavern, Royal Mile, Edinburgh.



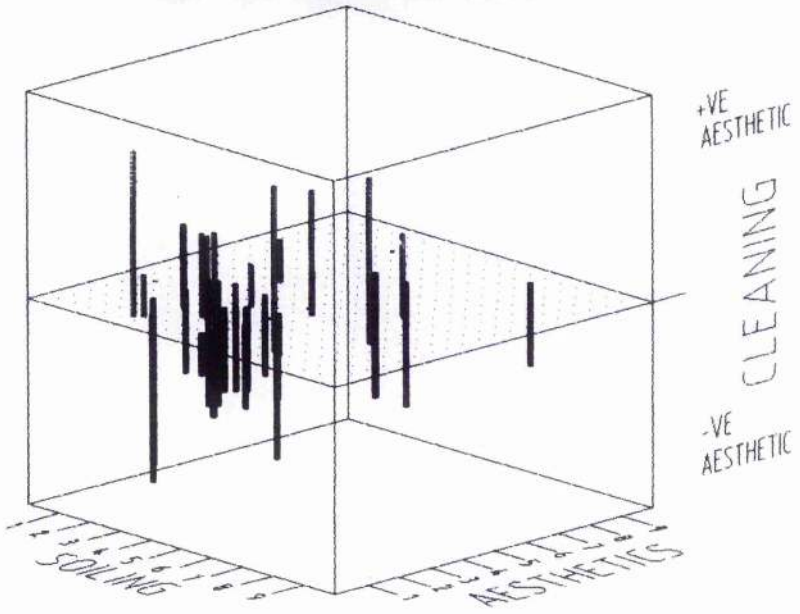


Plate 13.7 Royal Bank, North Bridge/High Street, Edinburgh.

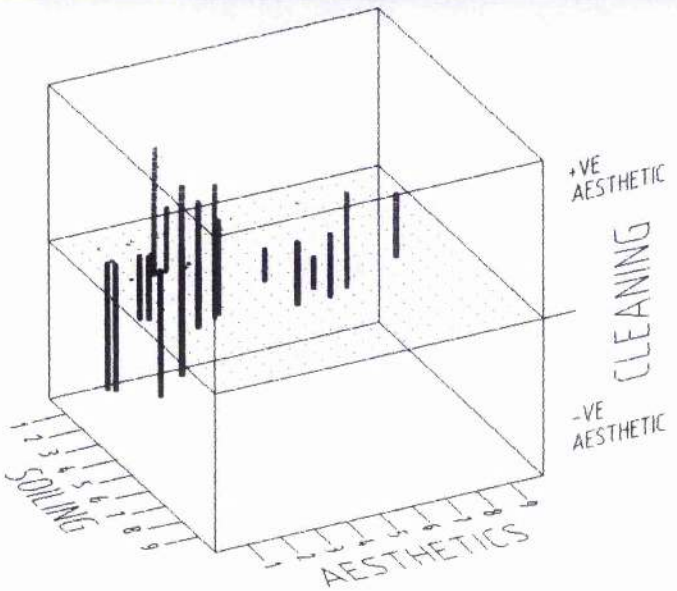


Plate 13.8 Lady Stair's House, Lady Stair's Close, Edinburgh.

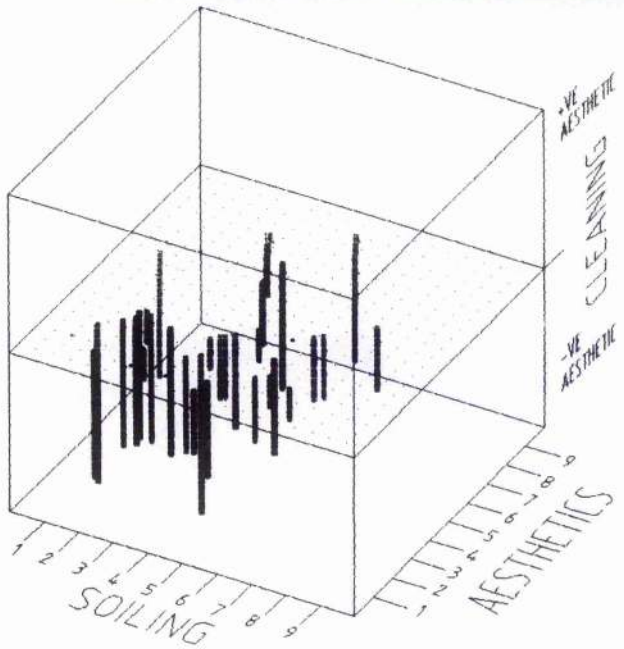


Plate 13.9 Royal British Hotel, Princes Street, Edinburgh.

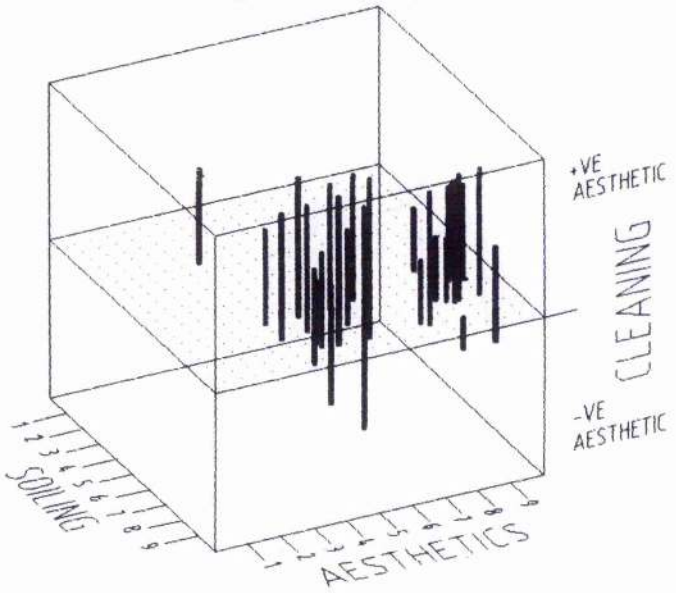
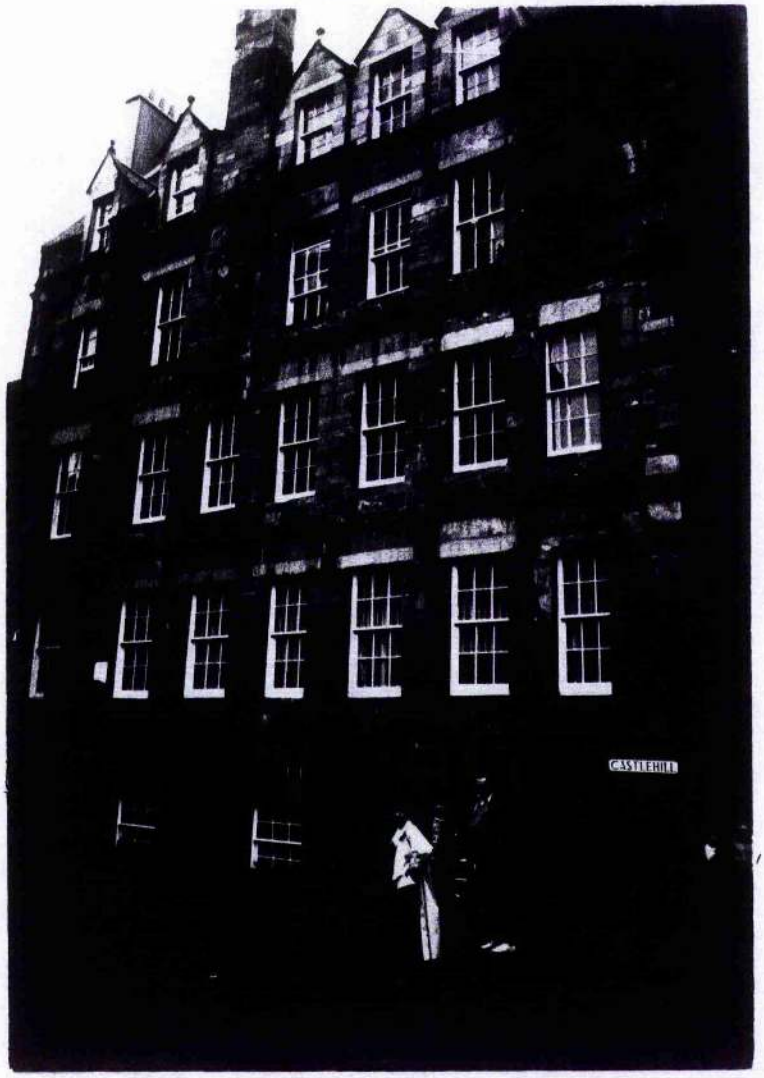


Plate 13.10 Boswell's Court, Castlehill, Edinburgh



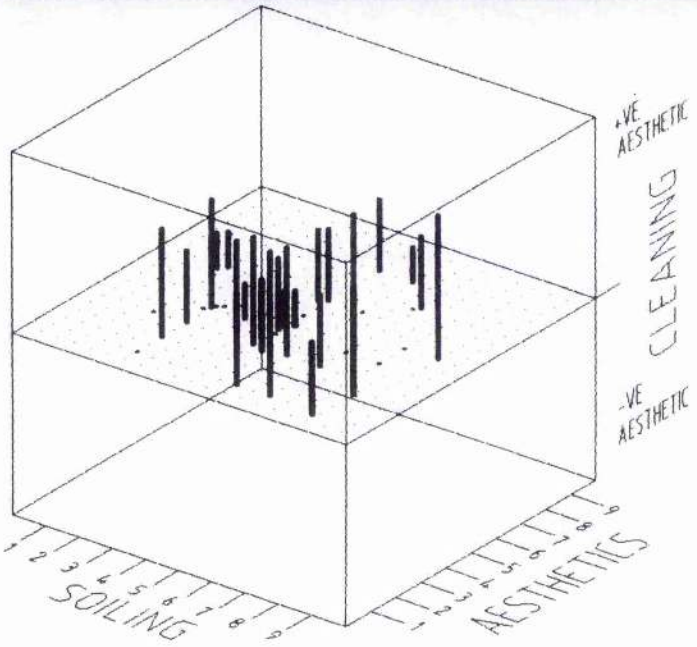
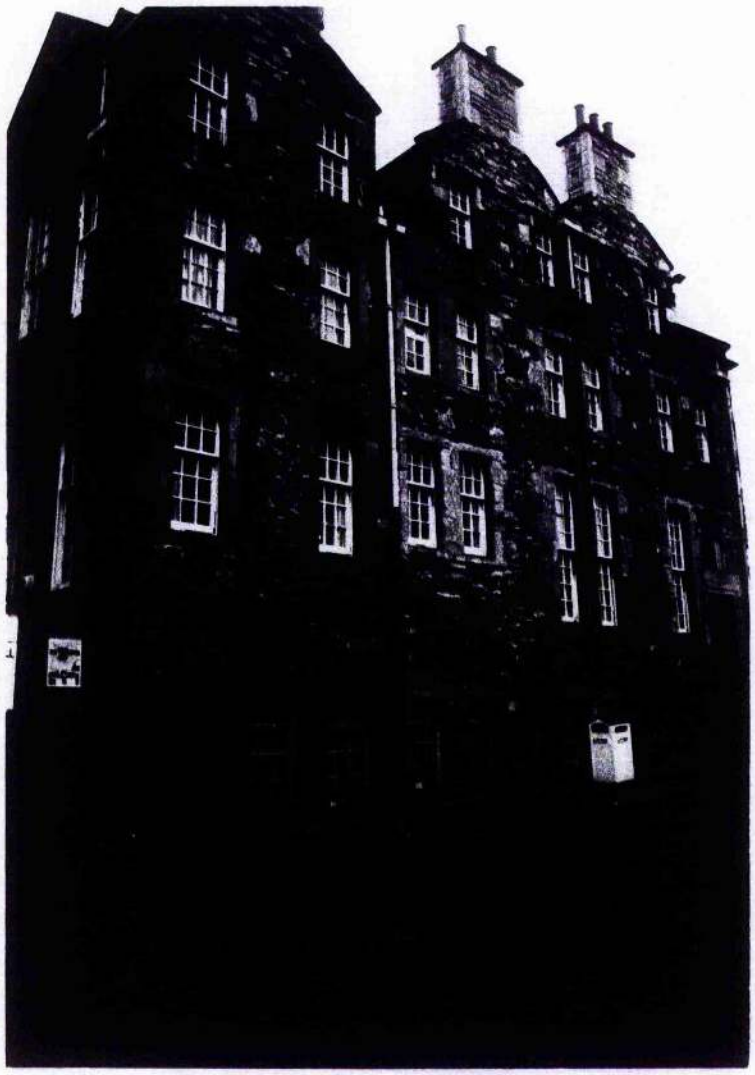


Plate 13.11 Castlehill School annex, Royal Mile, Edinburgh.



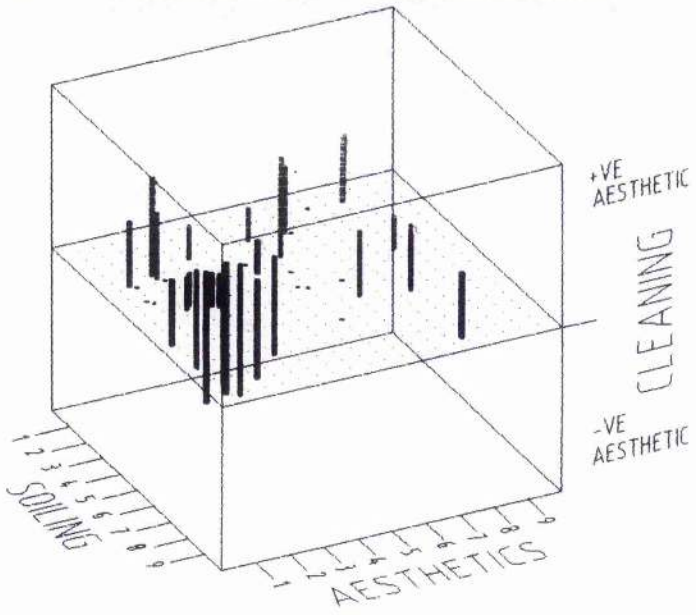


Plate 13.12 56 St. Vincent Street, Glasgow.

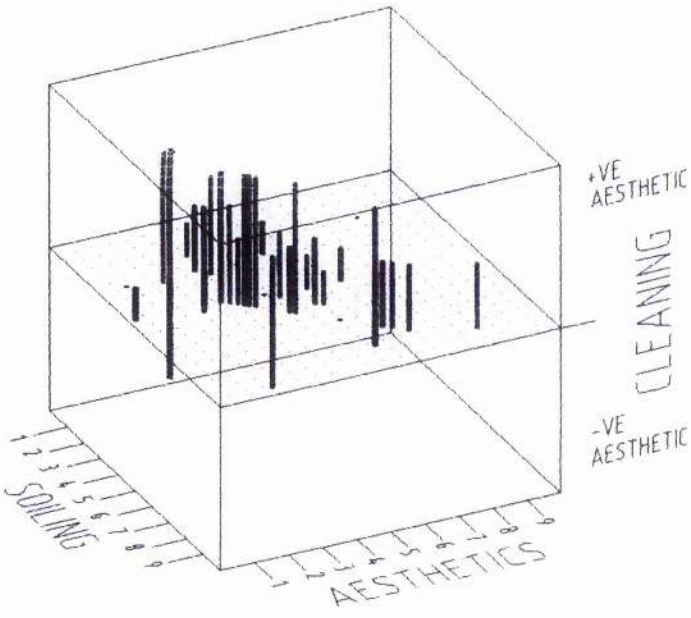
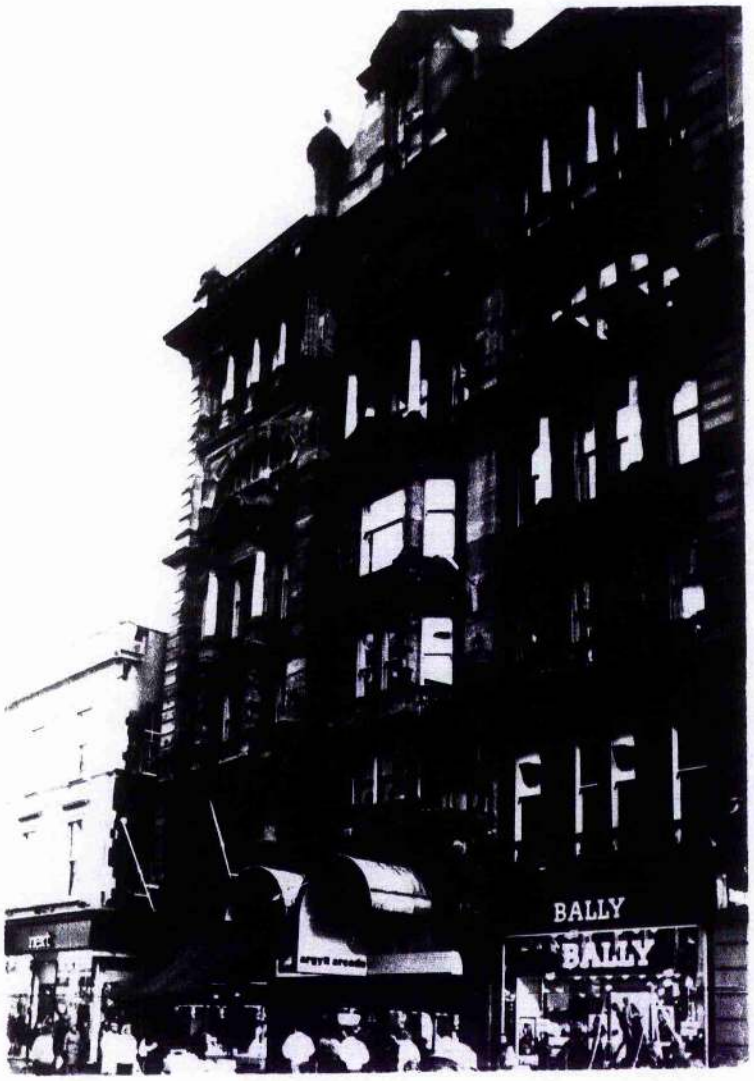


Plate 13.13 Argyll Arcade, Buchanan Street, Glasgow.



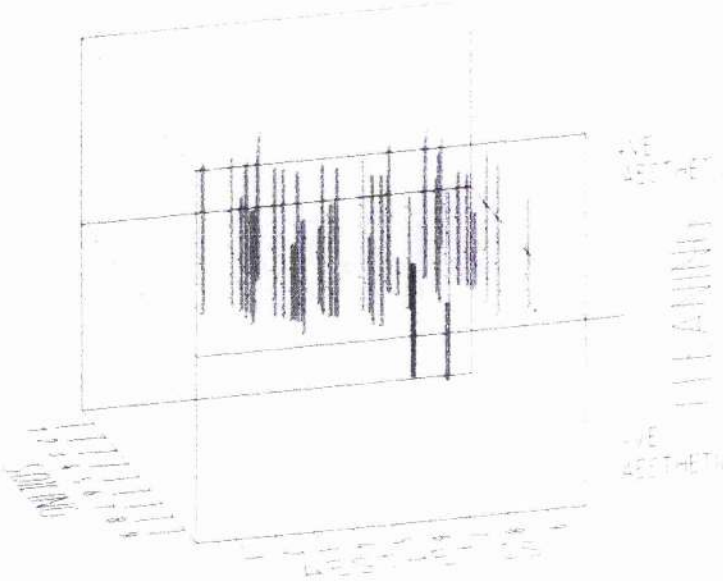
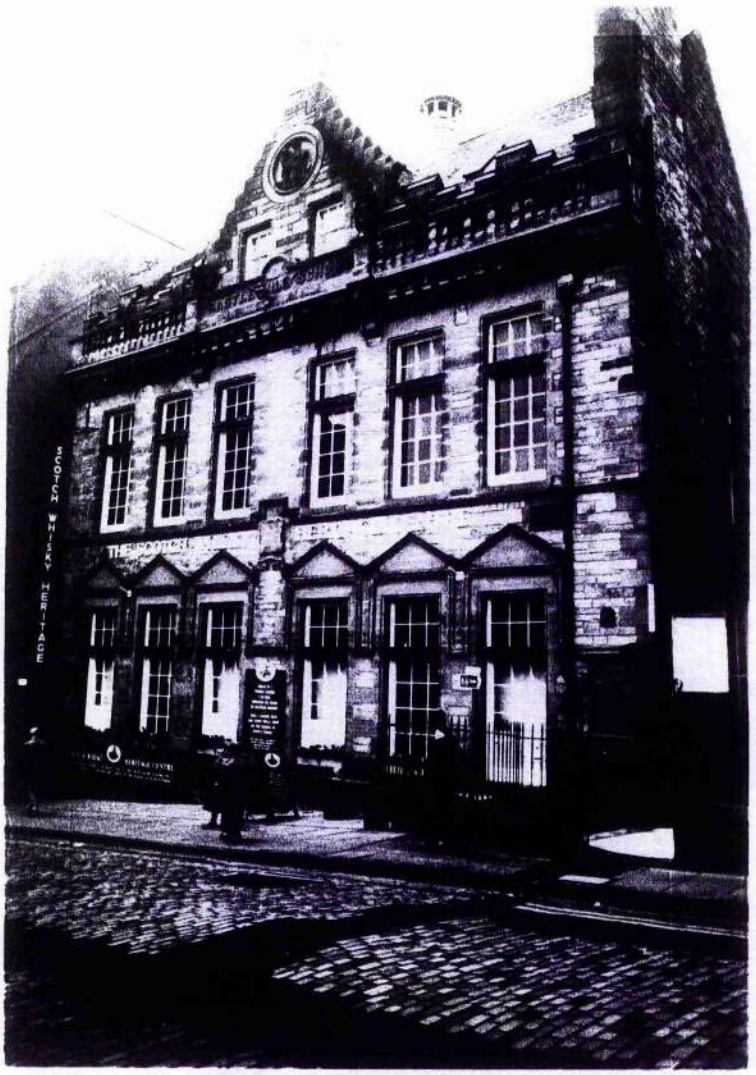


Plate 13.14 Castlehill School, Castlehill, Edinburgh.



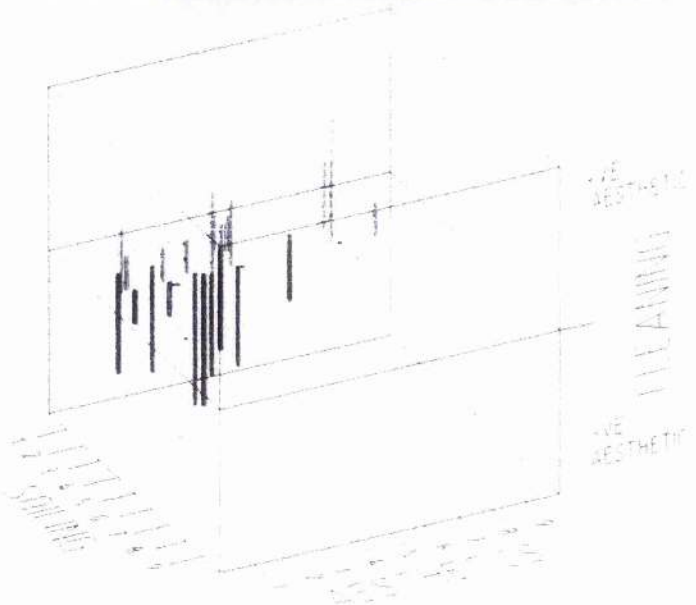
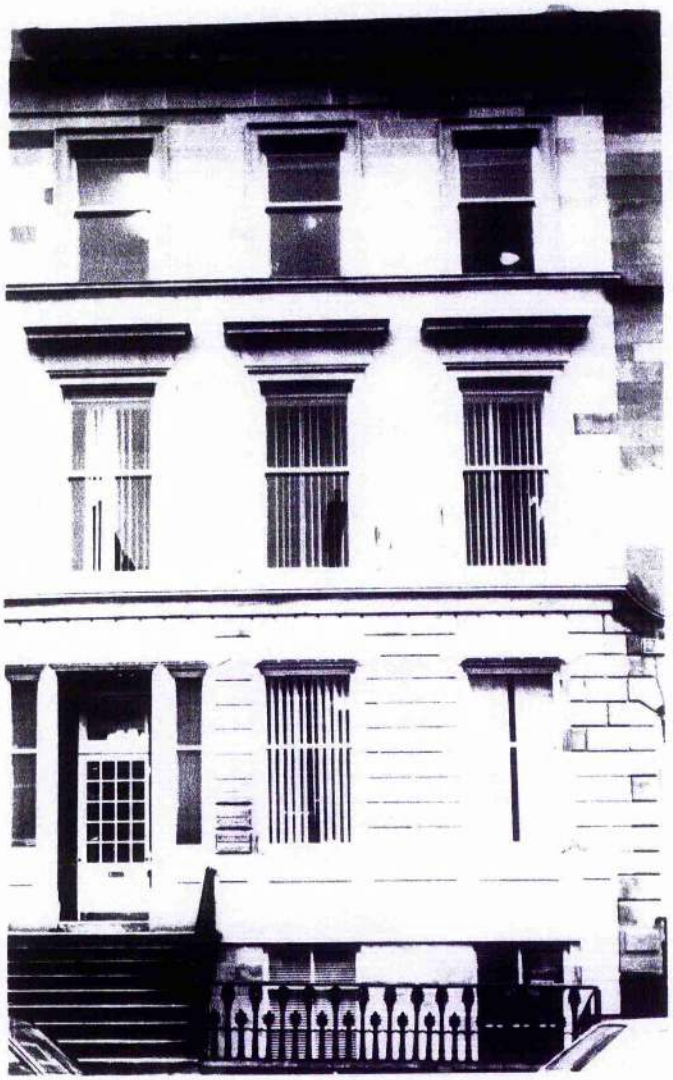


Plate 13.15 5 Park Circus Place, Glasgow.



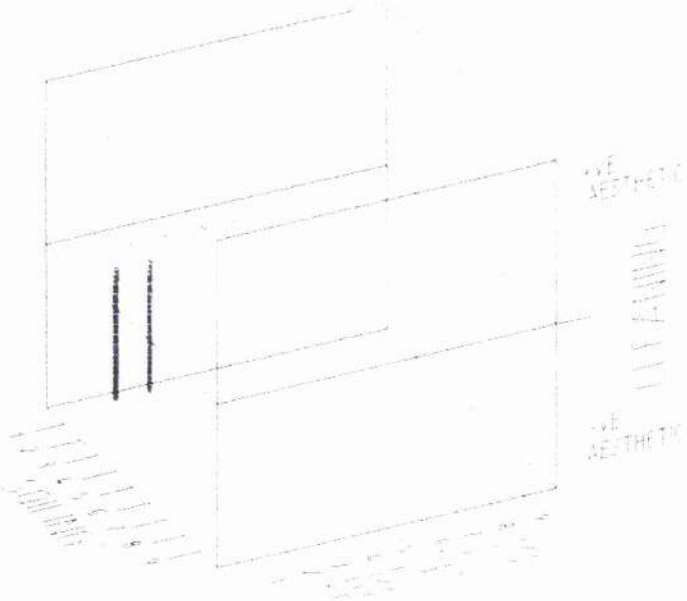


Plate 13.16 Royal Mile Mansions, Royal Mile, Edinburgh.

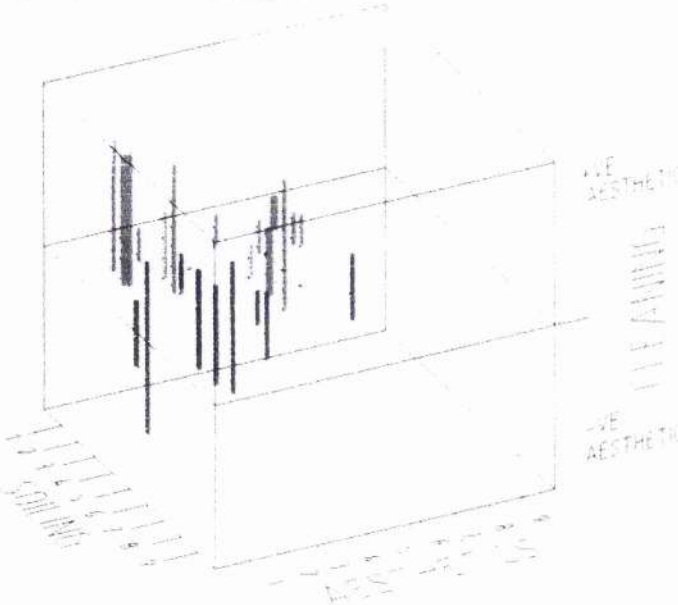


Plate 13.17 Tenements, Mound Place, Edinburgh.

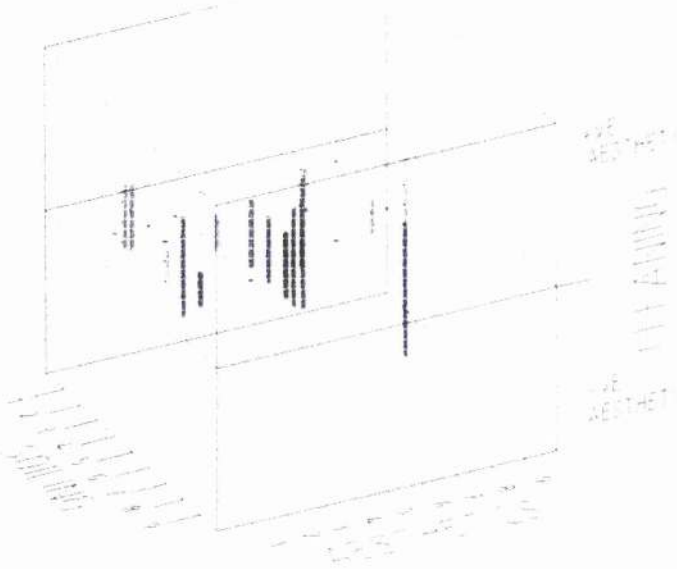


Plate 13.18 Haymarket Terrace, Edinburgh.

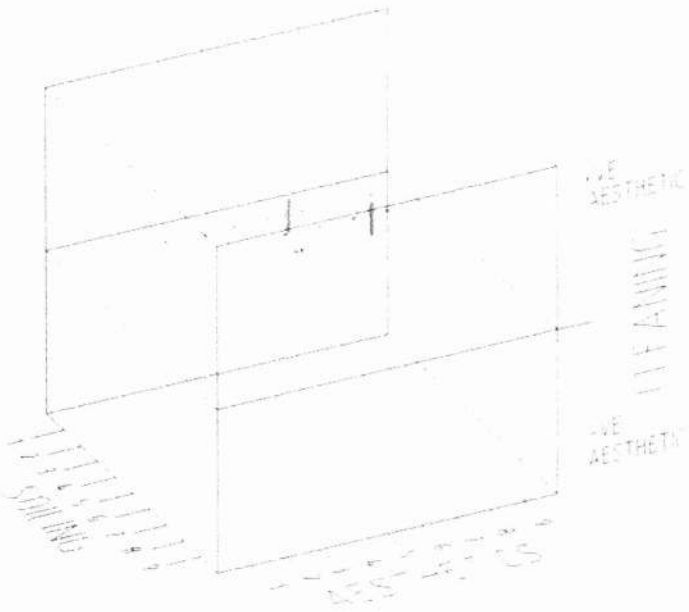
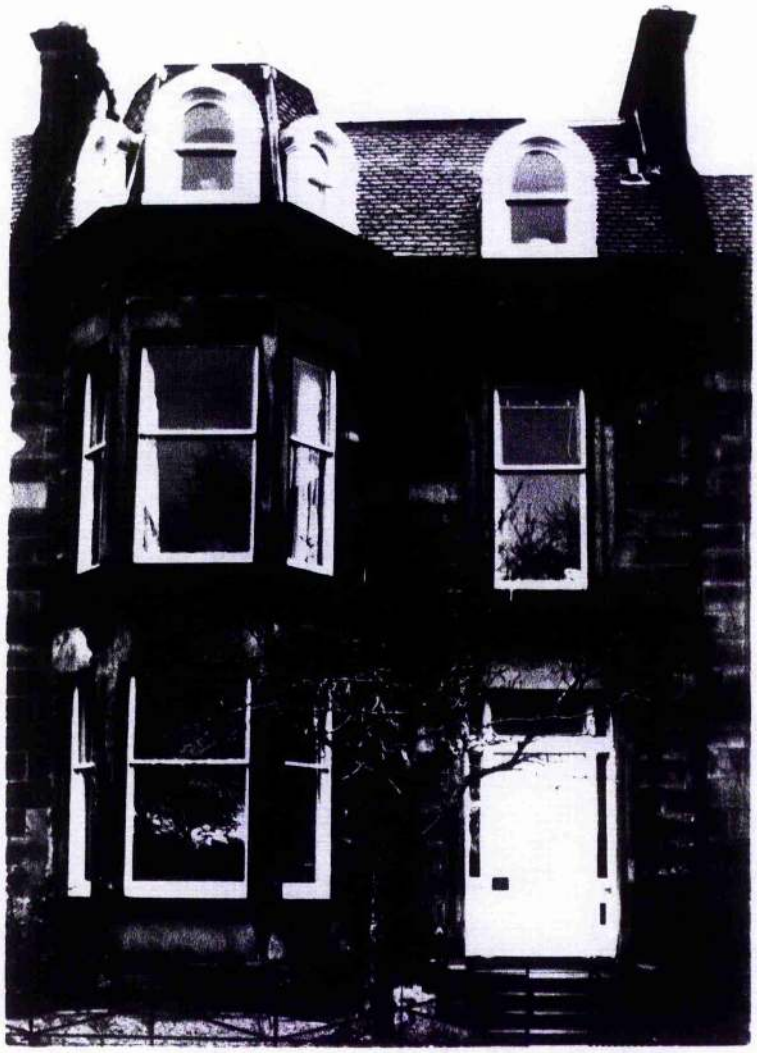


Plate 13.19 3 Magdala Crescent, Edinburgh.



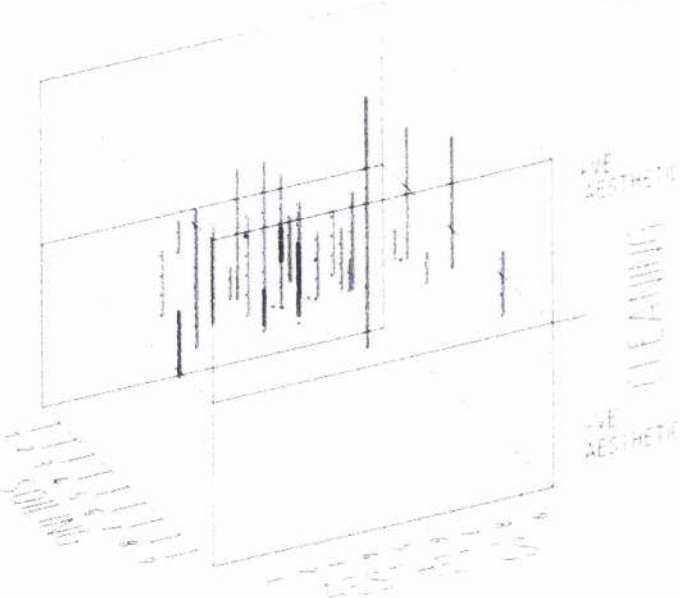
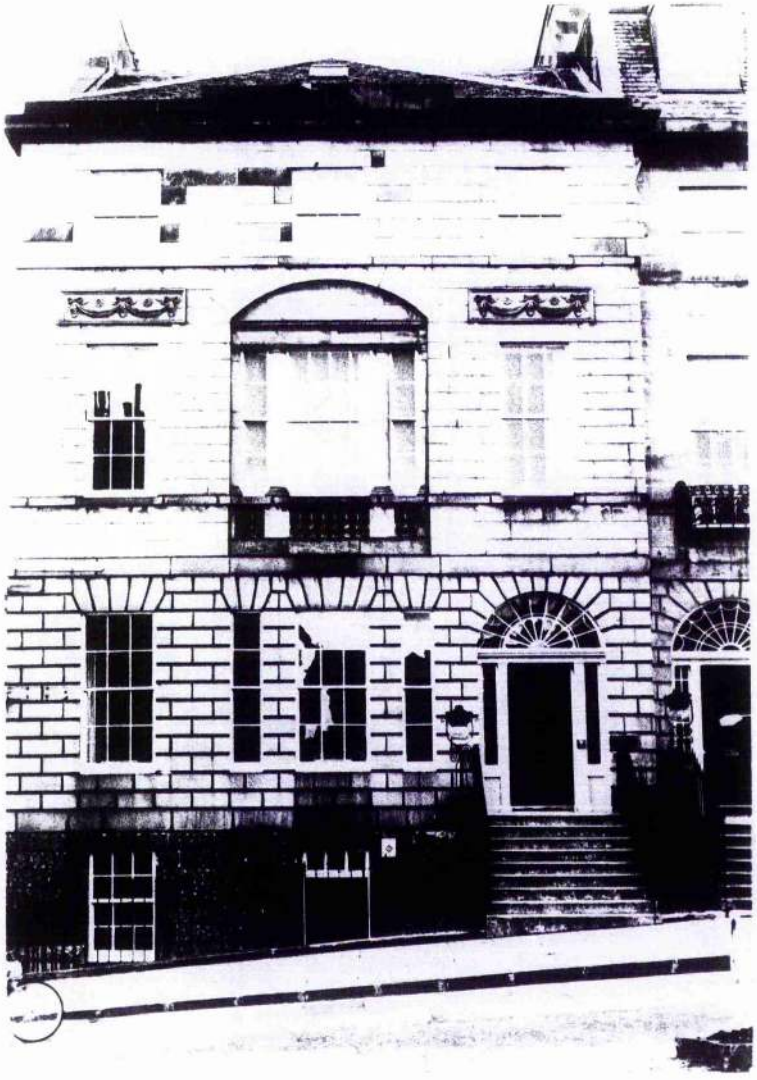


Plate 13.20 46 Charlotte Square, Edinburgh.



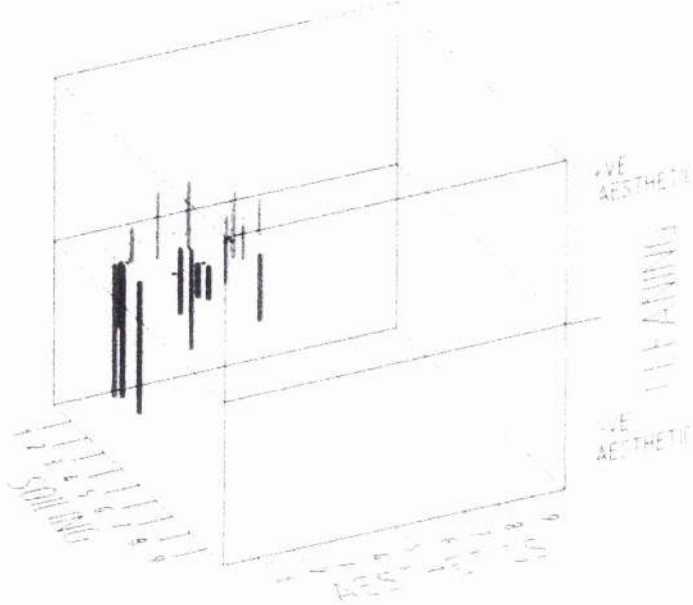
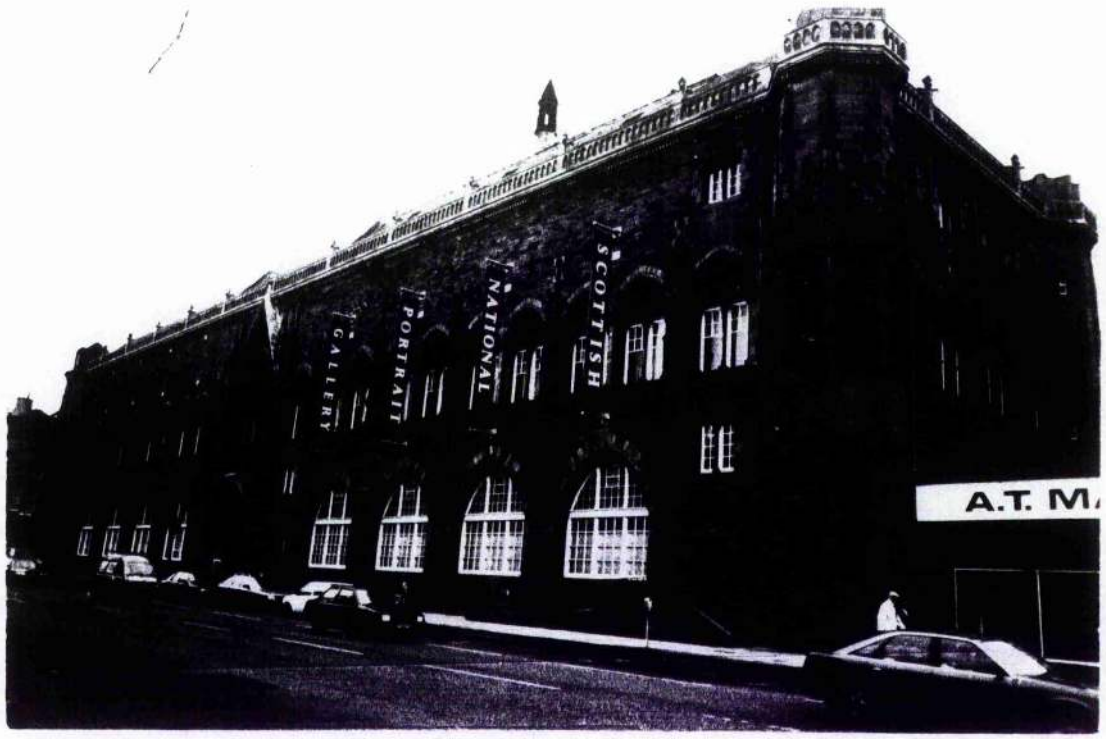


Plate 13.21 National Portrait Gallery, Queen Street, Edinburgh.



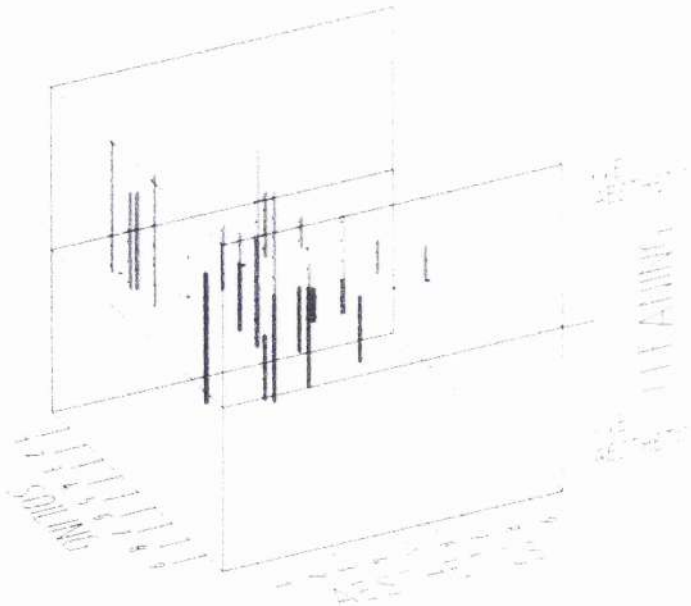


Plate 13.22 New College and Assembly Hall, Mound, Edinburgh.

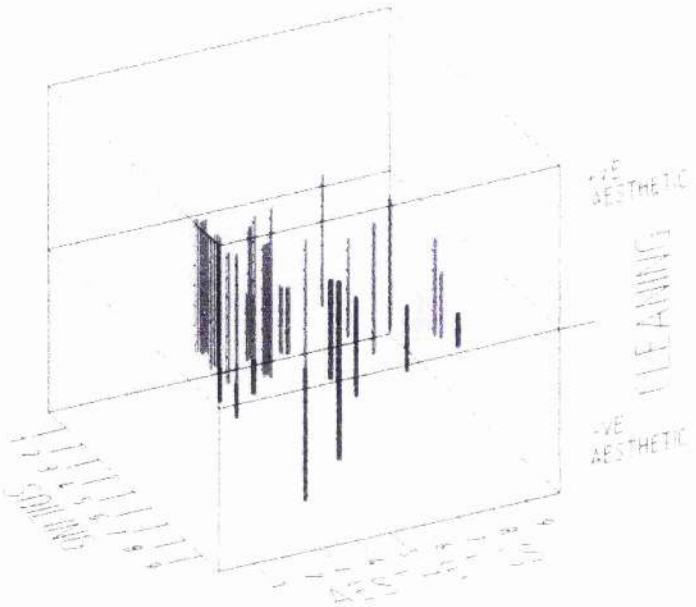
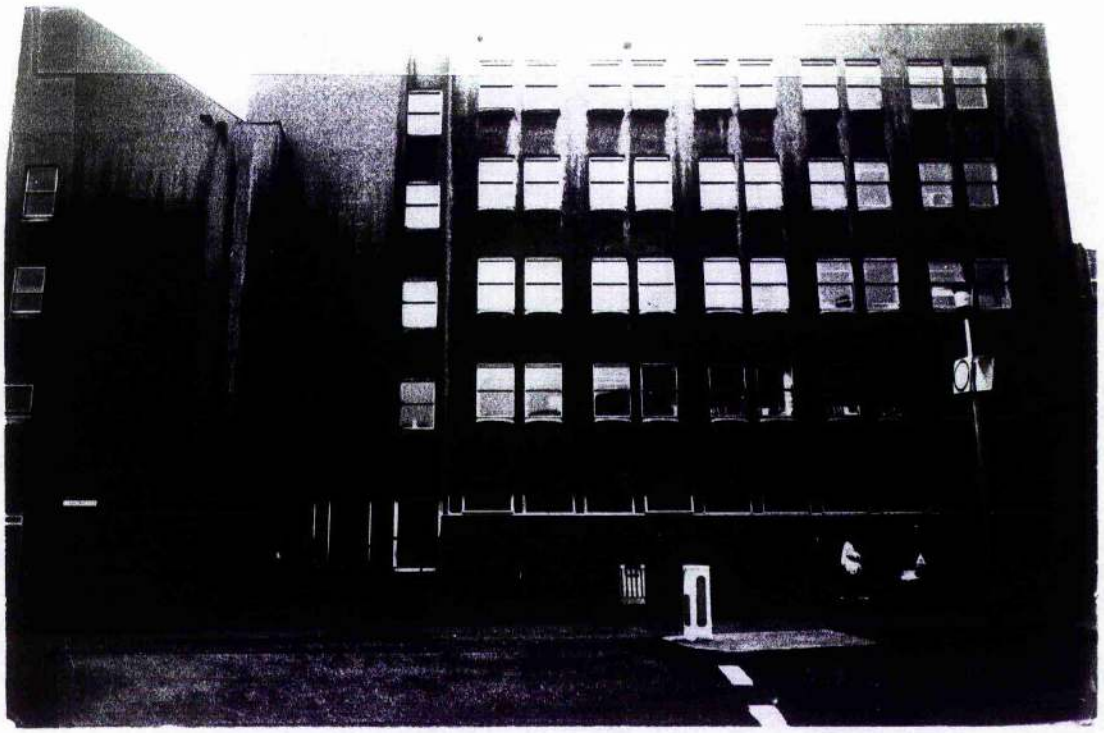


Plate 13.23 Office block, Cannongate/Horse Wynd, Edinburgh.



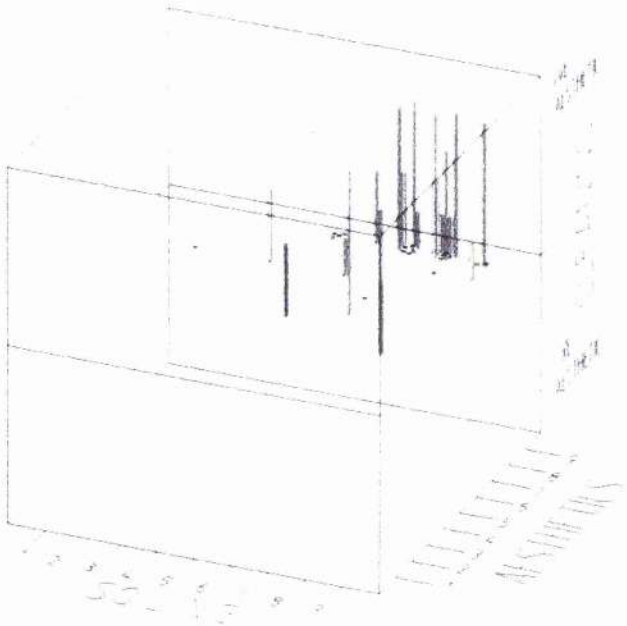


Plate 13.24 Castlehill, The Royal Mile, Edinburgh.

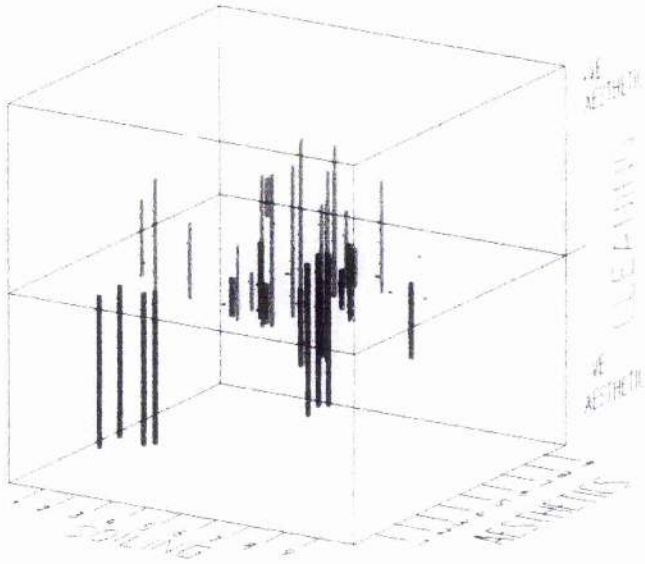


Plate 13.25 Bank of Scotland, George Street, Edinburgh.

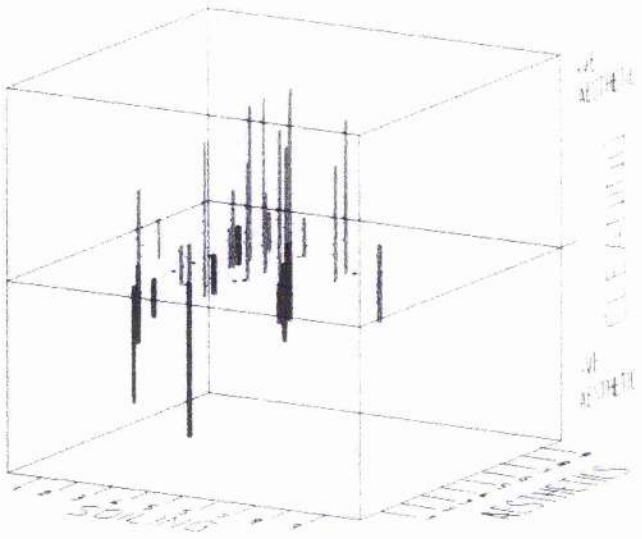


Plate 13.26 Offices, King Street / Osborne Street, Glasgow.

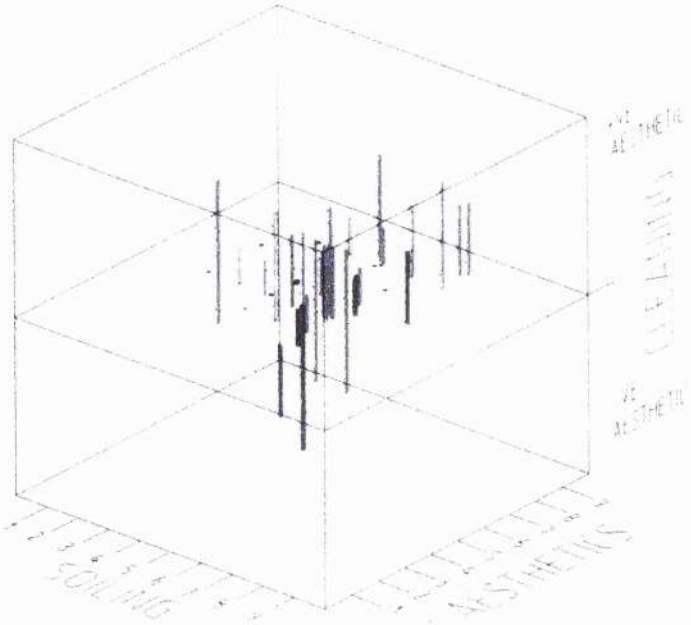


Plate 13.27 Patrick Geddes Hall, Ramsay Lane, Edinburgh.

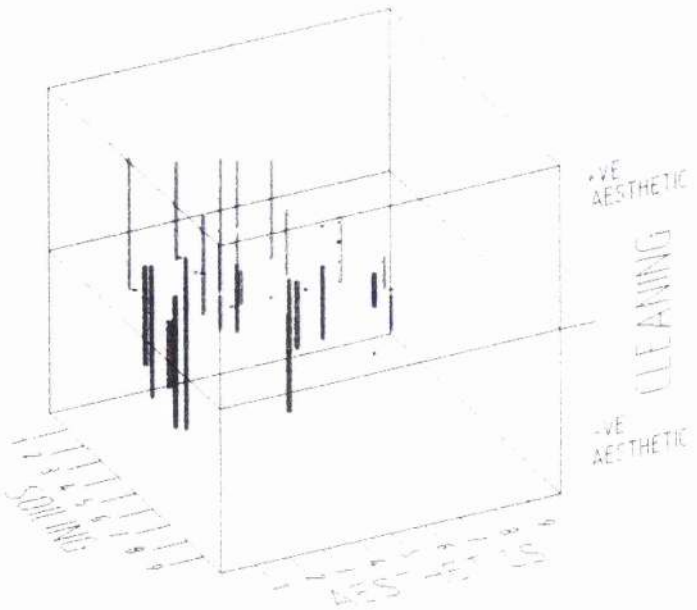


Plate 13.28 Milton House School, Canongate, Edinburgh.

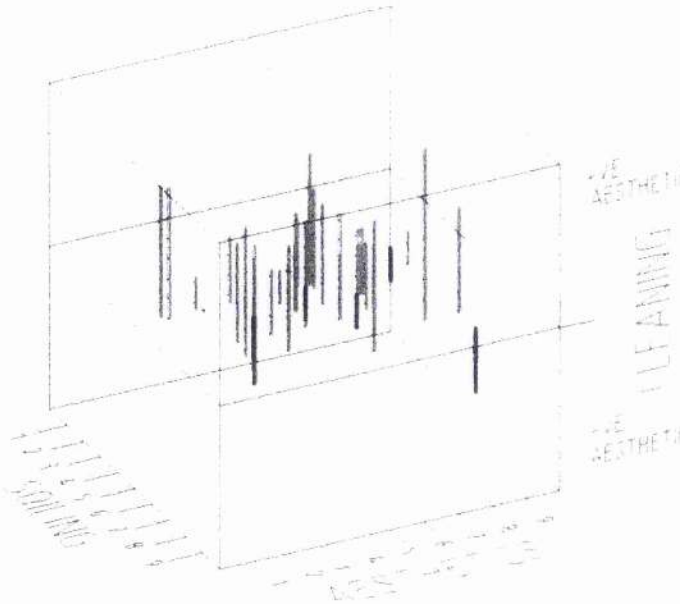


Plate 13.29 Donaldsons School, West Coates, Edinburgh.

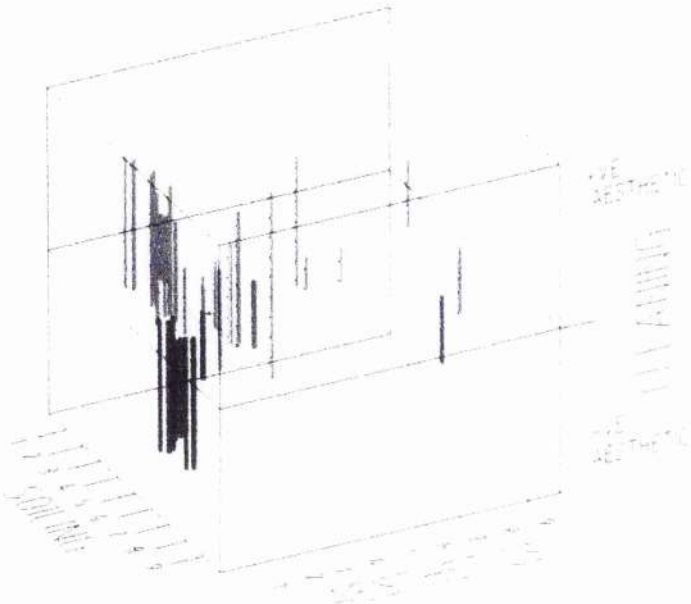
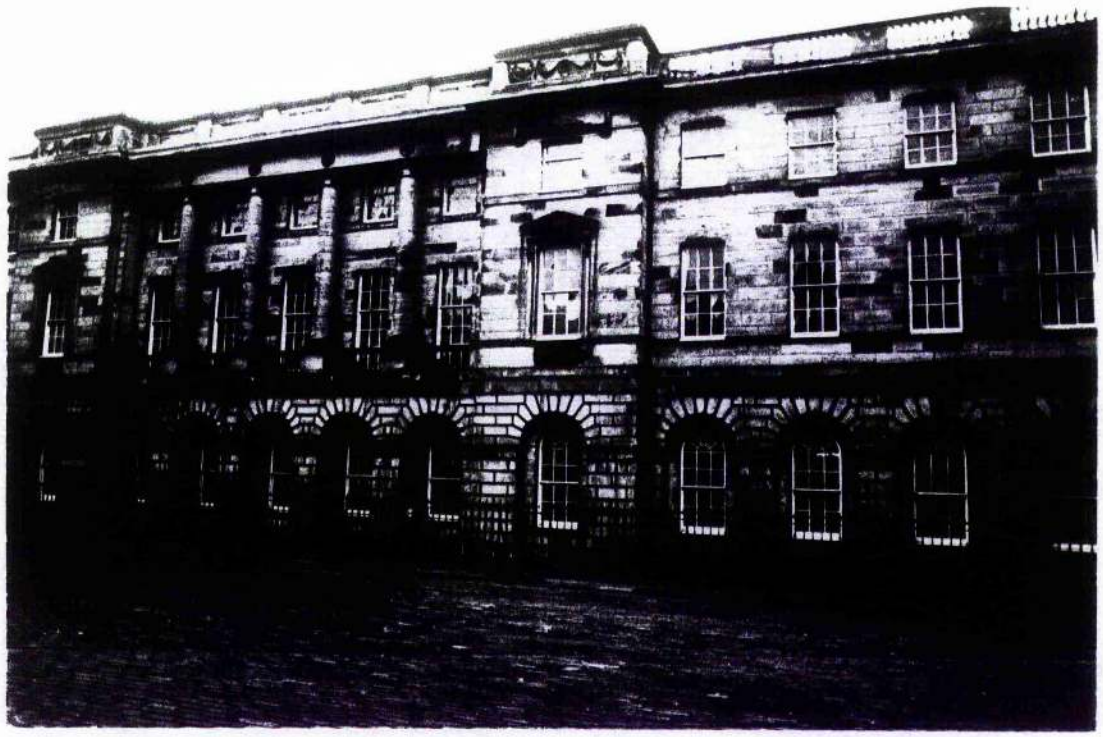


Plate 13.30 Signet Library, Parliament Square, Edinburgh.



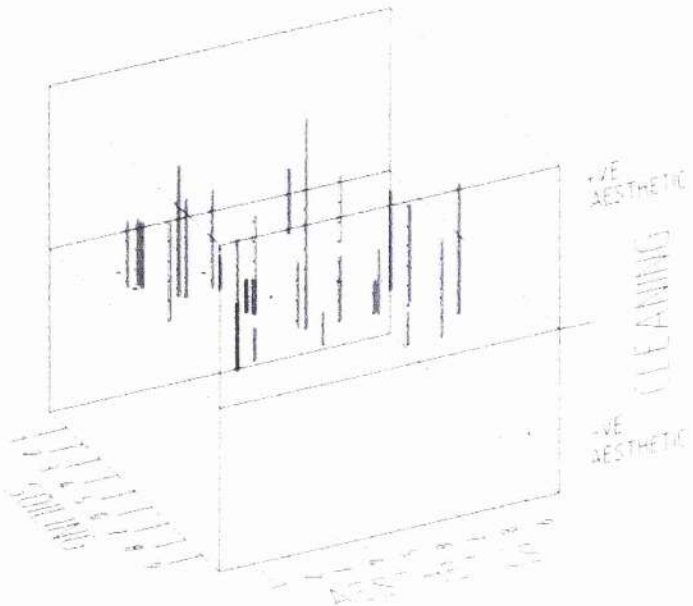


Plate 13.31 219 St Vincent Street, Glasgow.

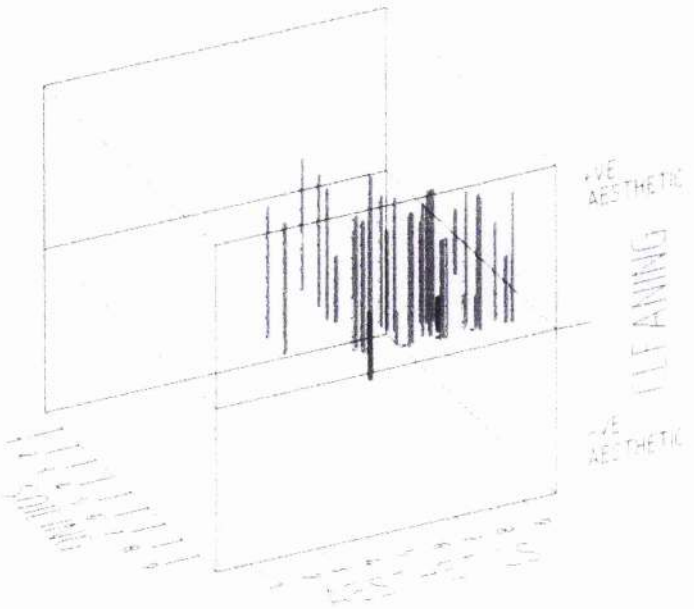


Plate 13.32 Palace Shop, Abbey Strand, Edinburgh.

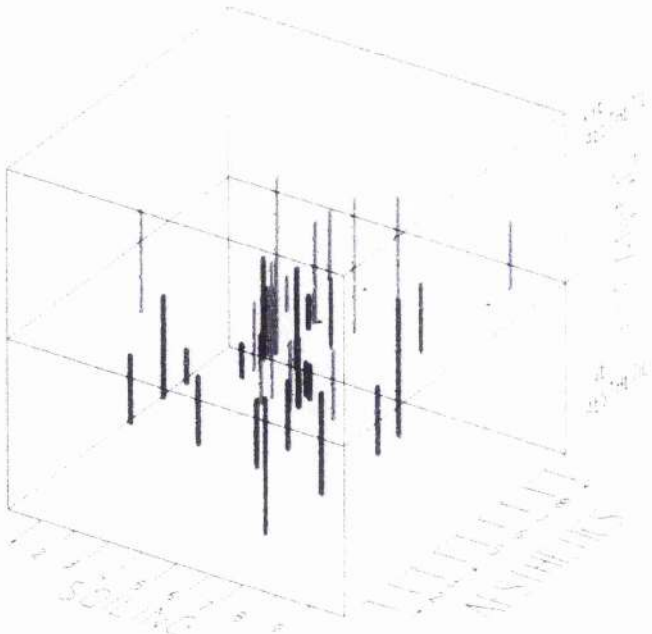
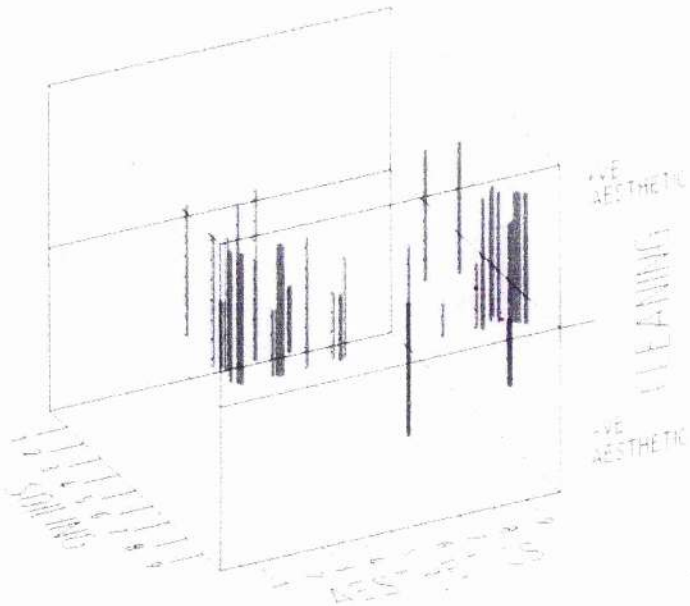


Plate 13.33 Royal High School, Regent Road, Edinburgh.



Chapter Fourteen

Towards an aesthetic theory of building soiling

INTRODUCTION

Weathering affects all buildings and all building materials. The effects of weathering on buildings and hence their visual appearance is dependent on the interaction of a range of factors which include the building material, patterns of wetting and drying, architectural features which influence the run off of rainwater and the deposition of atmospheric dirt and pollution.

The exterior of buildings pass through a cycle of change as soiling accumulates on the surface. The speed of this change may vary considerably. Materials vary in their susceptibility to the influences of weathering, but every material and so every facade alters in appearance after long exposure to wind and rain. Many modern buildings, for example those with exposed precast concrete exteriors or harled surfaces, quickly develop patterns of staining through rainwater run-off which are unrelated to any underlying architectural feature and may look unkempt after only a few years (e.g. Plate 13.24), while many old buildings which have developed large accumulations of soiling over centuries may display an aesthetic quality which enhances the visual appearance of the building. Carrie and Morel (1975) illustrate this neatly in their example of the porch of the church of St Margaret at Westminster. While many may perceive the facade (soiled through years of exposure to wind and rain) as an example of the displeasing soiling which covers many European cities, others argue that the moderate accumulations of soiling add to the building's visual quality. This view of the aesthetic effects

which soiling can have on some building facades is supported by the research reported in Chapters 9, 12 and 13.

It can be argued from the studies reported in Chapters 9, 12 and 13 that the soiling of buildings which is either consonant with the underlying texture of the building facade or enhances architectural details can, within certain limits enhance the aesthetic appeal of a building. The reported studies also suggests that soiling which is dissonant with the underlying texture of a building (e.g. heavy soiling which obscures colour, texture, etc.) or which is unrelated to the building's architecture is aesthetically displeasing. As many modern buildings are constructed of materials or are of designs, which do not allow for consonant type of weathering, they may well when soiled be less acceptable than older buildings which through the materials used or design features, allow for a longer period of consonant weathering.

AESTHETIC THEORY

Scruton (1979) argues that

> "To take an aesthetic interest in a building is to attend to it in all its completeness, to see it, not in terms of narrow or predetermined functions, but in terms of every visual significance that it will bear."

The result of soiling and weathering on the surface of buildings changes the visual significance of their facades. Hypothetically, soiling can be seen to progress through a series of changes, with facade cleaning interrupting this progression and returning the building to an earlier stage in the cycle.

Initially, light soiling on surfaces which have a uneven texture (e.g. rock-faced stone) lodges mainly in crevices and horizontal surfaces which rainwater has difficulty in dislodging. Similarly, light soiling around architectural detail adds to the visual complexity of the building by increasing contrast and shadowing effects. Verhoef (1988) argues that in northerly cities of Europe soiling can emphasise architectural designs which for much of the year would be lacking due to the absence of sharp, well defined shadows.

Moderate soiling of building facades can result in a change in the visual appearance of the building in a way which has an interactional effect with the underlying architectural features or stone surface. Moderate levels of soiling changes the visual complexity of the building (by obscuring some detail, colour and texture, etc.) while at the same time adding a pattern of soiling which was originally absent (Plate 14.1). This interactional effect appears to differ with stone type. While initially this soiling may be related to the underlying architectural surface, patterns of soiling eventually arise which are unrelated to the underlying detail. Heavy soiling eventually leads to a uniform blackening of the surface of the building which reduces the visual information in architectural detailing, and completely obscures the colour, texture and any shadowing effects. In effect the visual complexity of the facade is reduced by the even and complete blackening of the building facade. Entire buildings may progress through this pattern of soiling in a relatively consistent way or parts of facades may soil at different rates. Plate 14.2 illustrates this, with the upper gable end of the building obscured by the soiling while lower sections are much less heavily soiled.

Plate 14.1 Attachment of soiling to rock-faced ashlar.

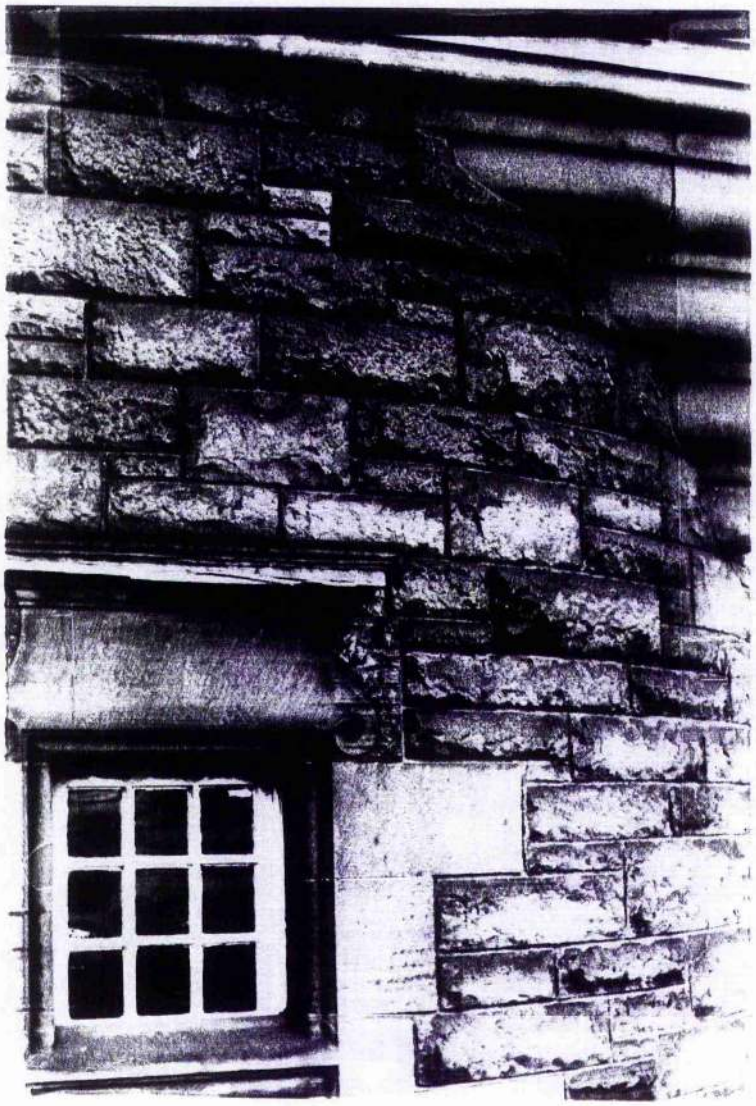


Plate 14.2 10 Randolf Cliff, Queensferry Road, Edinburgh.
Building showing different levels of soiling on the facade.

Results from the photographic studies of appraisals of buildings before and after cleaning (Chapter 9) and the aesthetic evaluation of buildings (Chapter 13) revealed the reduction in aesthetic appeal which can happen when buildings are heavily soiled. It can be hypothesized that a building goes through a cycle of soiling and hence of changes in complexity which have differing aesthetic implications.

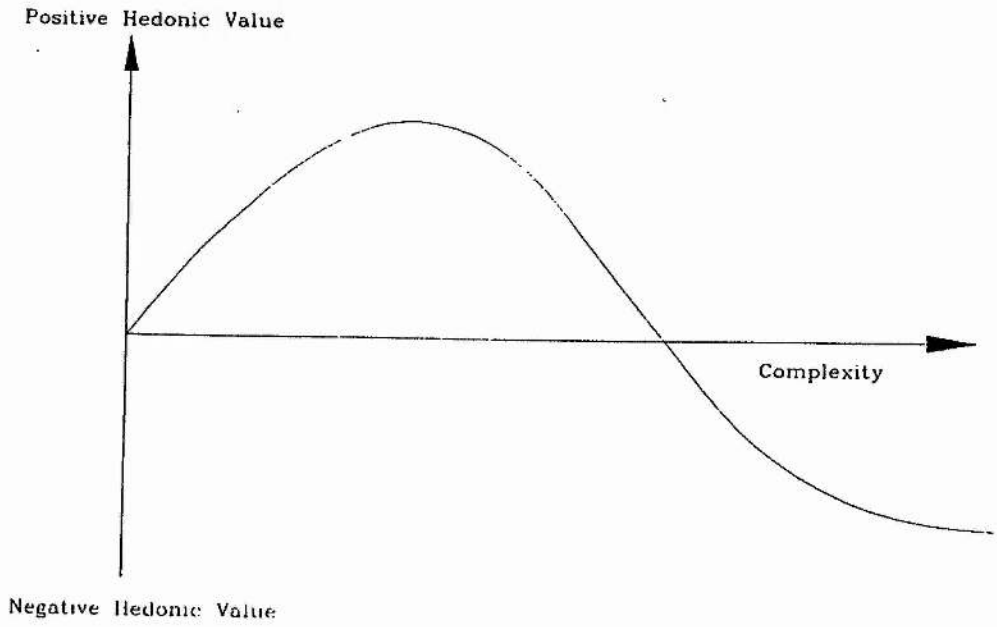
The concept of complexity is related to the concept of information rate, derived from information theory. Moles (1966) applied the original theory to human perception, partitioning communication into redundancy and message. This was taken further by Krampen (1979) who used the concept of the type-token ratio as a measure of the variability of facade designs (chapter 3). Studies in experimental aesthetics (Berlyne 1974), discussed in Chapter 2, have shown that ratings of pleasingness of relatively complex patterns varies from those of relatively simple patterns. As has been pointed out earlier, Canter (1977) in reviewing these studies argues that the stimulus material used,

> "almost by definition eschews any attempt to deal with the relevance of the environment presented or to explore its implications for the respondent."

While the early research on experimental aesthetics lacked any reference to the environment, these studies may well have relevance for the way in which aesthetic appreciation varies with the cycle of soiling of buildings. Berlyne (1974) in hypothesizing about the aesthetic appeal of works of art has reinterpreted the curve originally presented by Wundt (1874) to explain the relationship between hedonic value and complexity (Figure 14.1). The term hedonic value covers several

distinct variables, including degree of pleasure, preference or utility measured through verbal judgments, and is widely used as the main source of data for experimental aesthetics. Berlyne (1974) argues that positive hedonic values come about either through a moderate increase in arousal/complexity or through a decrease in arousal/complexity when arousal has reached an uncomfortably high level.

Figure 14.1 The relationship between hedonic value and complexity



The cycle of building weathering already referred to, suggests that soiling affects building complexity and thus hedonic value in a relationship shown by the graphs, Figure 14.2 and Figure 14.3.

These two graphs (Figure 14.2 and Figure 14.3) can be combined to produce a three dimensional graph (Figure 14.4). The shape of this graph may vary considerably due to factors such as type and age of building, material used in construction, etc. Figure 14.4 may hypothetically be seen to represent the weathering pattern of many rock faced and ashlar stone buildings constructed at the end of the last century, examples of which have been used in the photographic simulation research report in earlier chapters. On some buildings parts of the facade may be at different points on this graph. For example in Plate 14.2 parts of the facade with lower levels of soiling and a high level of complexity (i.e. towards the base of the building) are at a point nearer to the maximum aesthetic value.Those parts of the facade with heavier soiling and thus reduced complexity (i.e. upper parts of the building) are aesthetically less pleasing, and are thus at a lower point on the graph. With some cleaning techniques it may be possible to remove some degree of soiling from parts of the facade heavily soiled, thus returning the whole facade to maximum aesthetic value.

Figure 14.4 hypothesizes that initially, after construction, a building has a certain hedonic value level. After a number of years of weathering, where accumulations of light soiling are consistent with architectural features and the stone texture, complexity is increased and aesthetic value rises to a peak. Thereafter it begins to decline as soiling increases, becoming unrelated to, or obscuring underlying

architectural features. As soiling becomes increasingly heavy complexity is reduced and aesthetic value decreases to a point where the whole facade is blackened and complexity is at a minimum. In Figure 14.4, cleaning a building at the point of maximum soiling has the effect of returning it to a position nearer the beginning of the graph, and the weathering cycle is again reintroduced. The point at which it returns and the subsequent weathering effects may well depend on the method chosen for cleaning and the success of the cleaning process. Evidence from photographic studies of architecturally identical buildings which have undergone different cleaning treatments show different perceptual changes after cleaning (e.g. Park Circus Place).

From the study of the aesthetic appraisal of buildings (Chapter 13) it is clear that the nature of the relationship between soiling and buildings varies depending on the individual and the type of building, Figure 14.4 may be seen to represent a general position.

The model of aesthetics proposed supports, at least in part Berlyne's model, and certain hypotheses can be derived from it. The model would predict that an old building with light weathering is aesthetically more pleasing than the same building without soiling. Evidence to support this can be seen in the aesthetic appraisal of buildings study (Chapter 13) where several buildings were judged to be moderately soiled and where cleaning was seen as likely to be aesthetically detrimental.

From this model it may also be possible to predict at what point in the weathering cycle a building should be cleaned, i.e. when aesthetic value declines below the

level equivalent to that of the building when cleaned. Evidence from the aesthetic appraisal of buildings study (Chapter 13) clearly shows that when buildings become heavily soiled there is a general tendency to see the building as being likely to be improved by cleaning.

In addition to interacting with the visual complexity of the facade, soiling also adds a further historical dimension to building facades. Evidence from the before and after cleaning study (Chapter 9) has shown the reduction in perceived age of a building following cleaning. A number of the residents and architects who were surveyed (Chapters 10 and 12) also commented on this aspect, indicating how cleaning in some way removes part of the history of the building. Perhaps the best example of this historical association is seen in the general opposition to the cleaning of Edinburgh Castle, were soiling in addition to giving increased complexity to the building also adds a historical significance which would be lost on cleaning. Interestingly, this does not seem to apply to The Sir Walter Scott Monument, where respondents were generally more in favour of cleaning. This may be because the building is very heavily soiled, at a low level of complexity and thus aesthetic value, or because the building, for many, has not the same historical significance as Edinburgh Castle. It seems likely that some combination of both factors may be involved.

Figure 14.2 Relationship between aesthetic value and soiling.

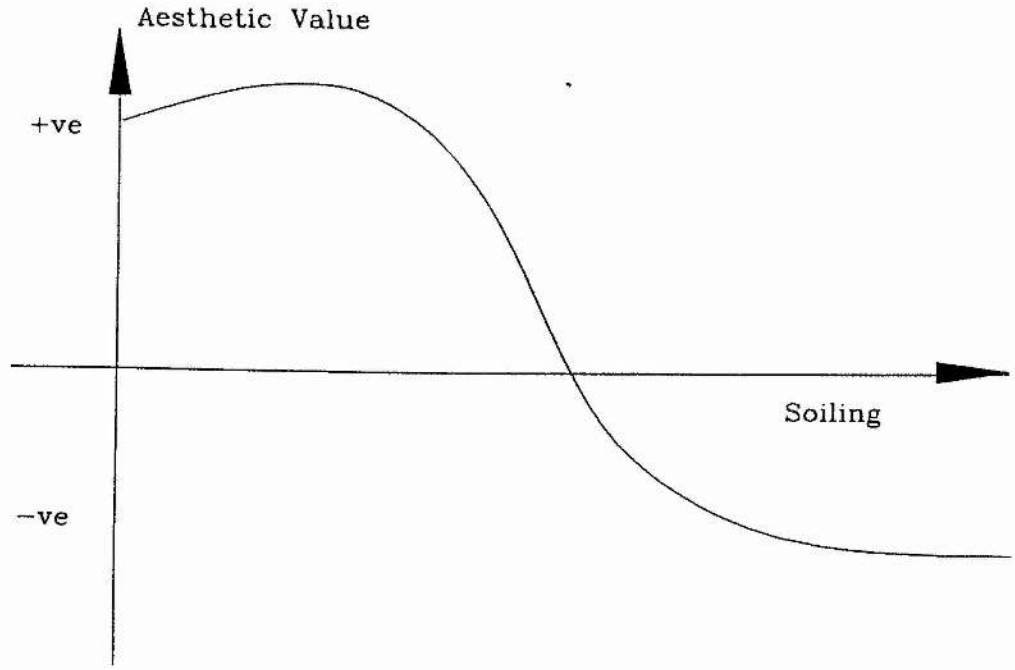


Figure 14.3 Relationship between aesthetic value and complexity.

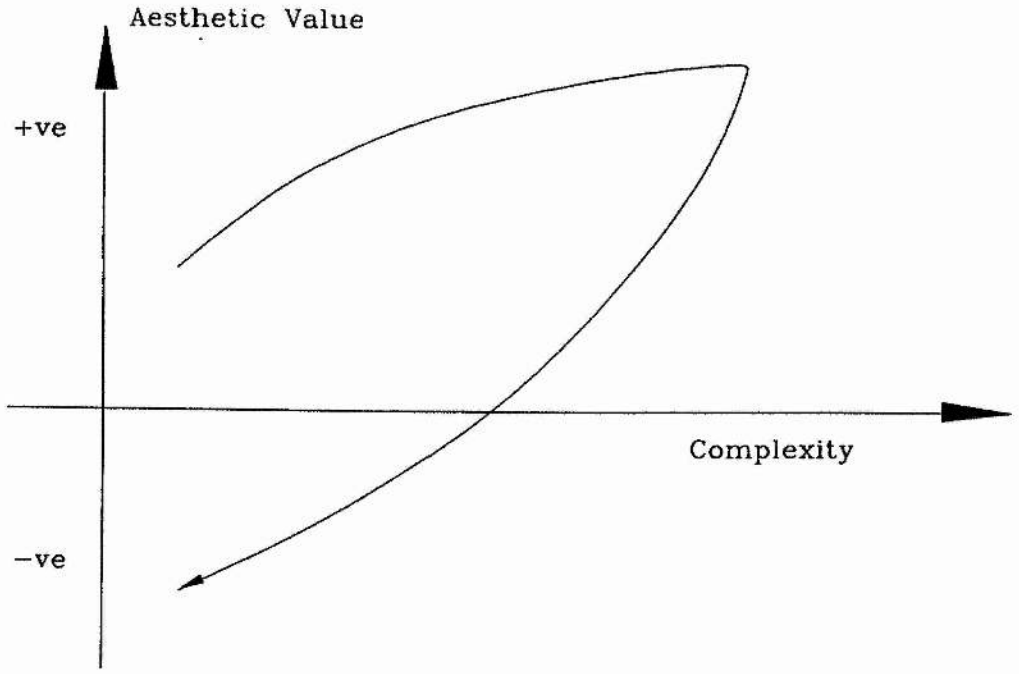
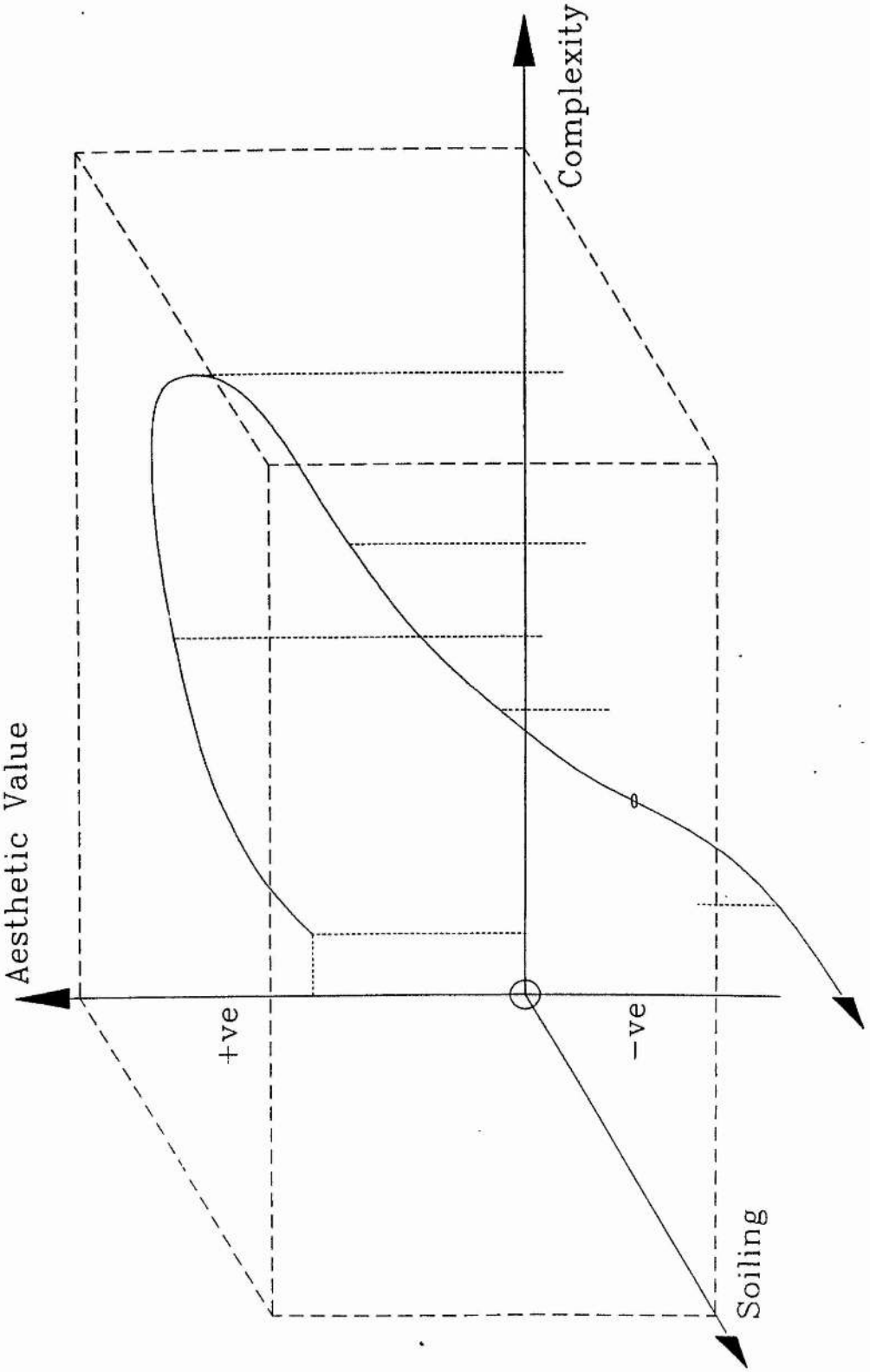


Figure 14.4 Relationship between aesthetic value, soiling and complexity.



The model proposed is only tentative, clearly the relationship between soiling, buildings and people is a complex one. Many of the architects surveyed accepted the aesthetic value of light soiling, the non architect more indirectly so through statements which suggest soiling "adds character" to a building.

Buildings whose architecture does not appear to allow for the aesthetic effects of soiling may only display a decrease in aesthetic value as a result of weathering. The rate of decrease in hedonic value is also likely to vary considerably. Verhoef (1988) argues for an approach to architecture which takes account of weathering changes over time.

The tentative theory of building soiling and aesthetics proposed here can be traced back through psychologists (such as Kaplan 1982, Wohlwell 1976) working on environmental aesthetics, to the work of Berlyne and beyond to Wundt, widely believed to be the founding father of modern psychology.

Bibliography

Abercrombie, S. (1984). Architecture as Art: an esthetic analysis. New York: Van Nostran Reinhold.

Aldrich, V. (1963). Treating the architect as an artist. in Foundations of Philosophy. Englewood Cliffs, N.J. Prentice-Hall.

Altman,I. and Wohlwill,J.F. (1976). (Eds) Human Behaviour and Environment, Vol.1. New York: Plenum.

Andrew, C. (1992). Towards an aesthetic theory of building soiling. In R.G.M.Webster (ed) Stone Cleaning and the nature, soiling and decay mechanisms of stone. Donhead.

Andrew, C. Crawford, E. (1992). Conservation and planning considerations in stone cleaning. In R.G.M.Webster (Ed) Stone Cleaning and the nature, soiling and decay mechanisms of stone. Donhead.

Arnheim, R. (1956). Art and Visual Perception. A psychology of the creative eye. London: Faber and Faber.

Bartlett, F.C. (1932). Remembering. Cambridge: Cambridge University Press.

Berlyne, D. E. (1960). Conflict arousal and curiosity. New York: McGraw Hill.

Berlyne, D. E. (1972). Ends and means of experimental aesthetics. *Canadian Journal of Psychology* **26**, 303-325.

Berlyne, D. E.(1974). Studies in the new experimental aesthetics. Washington, D.C. Hemisphere.

Birkhoff, G.D. (1950). Collected mathematical Papers. The American Mathematical Society, New York.

Bortz, J. (1972). in Krampen, M. (1979). Meaning in the urban environment. London: Pion.

Building Research Establishment (1972). Digest 139. Control of lichens, moulds and similar growths.

Brenner, M., Brown,J., and Canter, D. (1985). The research interview. Academic Press: Harcourt Brace Jovanovich.

Bruner, J.S. (1957). On Perceptual Rediness. *Psychological Review* **64**, 123-152.

Breuer, L.F. and Lindauer, M.S. (1976). Judgements of historical architectural styles. **42**, 1181-1182.

Canter, D. (1969). An intergroup comparison of connative dimensions in architecture. *Environment and Behaviour* **1** (1) June. pp 37-48.

Canter, D. (1977). The psychology of place. London: Architectural Press.

Canter, D., Stringer, P,, Griffiths, I.,Boyce, P., and Kenny, C. (1975). Environmental Interaction: Psychological Approaches to our Physical surroundings. London: Surrey University Press.

Carlson, A. (1986). Reconstructing the aesthetics of architecture. *Journal of Aesthetic Education*. 20, 4, 21-27.

Carrie and Morel (1975). in Verhoef, L.G.W. (Ed) (1988). Rilem Report, Soiling and cleaning of building facades. Chapman Hall.

Collins, J.B. (1969). Some verbal dimensions of architectural space perception. Unpublished doctoral dissertation, University of Utah, Salt Lake City.

Craik, K.H. (1966). Environmental display adjective checklist. Unpublished paper, University of California, Institute of Personality Assessment and REsearch, Berkley.

Crozier, J.B. (1972). Verbal and exploratory responses to sound sequences of varying complexity. Unpublished Ph.D. thesis, University of Toronto.

Cullen, G. (1961). The concise townscape. London: Architectural Press.

Empson, W. (1955). Seven types of ambiguity. NewYork: Meridian.

Fade, A. The evaluation of psychological concepts concerning the environment through a concept specific and a universal semantic differential. Zeitschrift fur Experimentelle und Angewandte Psychologie, 25, 367-378.

Findlay, R.A. and Field, K.F. (1982). Functional roles of visual complexity in user perceptions of architecture. E*nvironmental Design Research Association*. **13**, 145-153.

Fitch, J.M. (1988). Experiential context of the aesthetic process. J*ournal of Architectural Education*. 41, 4-9.

Franke,J. and Bortz, J. (1972). in Krampen, M. (1979). Meaning in the urban environment. London: Pion.

Garling, T. (1976). Multidimensional scaling and semantic differential scaling technique study of the perception of environmental settings. *Scandinavian Journal of Psychology* **17**, 323-332.

Gifford, R.D. (1976). Personal and situational factors in judgments of typical architecture. unpublished PhD. thesis. Simon Fraser University.

Grant, C. (1982). Fouling of terrestrial substrates by algae and implications for control- a review, *International Biodeterioration Bulletin*, 18,3, 57-65.

Griffin, F., and Millet, M. (1984). Shady aesthetics. *Journal of Architectural Education* 37, 43-60.

Groat, L. (1982). Meaning in Post-Modern architecture. An examination using the multiple sorting task. *Journal of Environmental Psychology* 2,3-22.

Harrison, J. and Sarre, P. (1975). Personal construct theory in the measuremnet of environmental images. *Environment and Behaviour* 7, 3-58.

Hershberger, R.G. (1972). Towards a set of semantic scales to measure the meaning of designed environments. In W.J. Mitchell (Ed.), Environmental design: Research and practice.Proceedings of the Third Environmental Design Research Association Conference (Vol. 1, pp. 6-4-1 - 6-4-10). Los Angeles: UCLA.

Hershberger, R.G. and Cass, R.C. (1974). Predicting user responses to buildings. In Davis, G. (Ed) *Field Applications.* 117-134. EDRA 5 Evaluation and Application (Ed) Carson, D. Washington, DC: Environmental Design Research Association.

Herzog, T.R. (1989). A cognitive analysis of preference for urban nature. *Journal of Environmental Psychology* 9,27-43.

Historic Buildings and Monuments (1987). Memorandum of guidance on listed buildings and conservation areas. Scottish Development Department, Historic Buildings and monuments, Edinburgh.

Howard, R. , Mlynarski, F., Sauer, G. (1972). A comparitive analysis of affective responses to real and represented environments. In Mitchell (Ed) Environment Design Research and Practice. EDRA 3.

Hubbard, H.V. and Kimball, T. (1917). An introduction to the study of landscape design. New York: Macmillan.

Joedicke, L., Dirlewanger, H., Geisler, E., and Magnago,V. (1975). in Krampen, M. (1979). Meaning in the urban environment. London: Pion.

Kaplan, S. (1976). Adaptation, structure and Knowledge. in Moore, G.T. and Golledge, R.G. (Eds), Environmental Knowing, pp32-45. Stroudsburg, Pa: Dowden, Hutchinson and Ross.

Kaplan, S. (1982). Where cognition and affect meet: a theoretical analysis of preference in Bart, P. Chen, A. and Francescato, G. (Eds) Envoronmental Design Reseach Association.

Kaplan, S. (1987). Aesthetic affect and cognition: environmental preference from an evolutionary perspective. *Environment and Behaviour* 6, 3-32.

Kaplan, S., and Kaplan, R. (1982). Cognition and environment: Coping in an uncertain world. New York: Praeger.

Kaplan, S., and Kaplan, R. and Wendt, J.S. (1972). Rated prefernce and complexity for natural and urban visual material. *Perception and Psychophysics* **12**, 354-356.

Kelly, G. A. (1955). The psychology of personal constructs. New York: Norton.

Krampen, M. (1971). in Krampen, M. (1979). Meaning in the urban environment. London: Pion.

Krampen, M. (1974). A possible Analogy Between (Psycho-) Liguistic and Architectural Measurement- The Type-Token Ratio (TTR). In Canter, D. and Lee, T. Psychology and the built environment. Architectural Press.

Krampen, M. (1979). Meaning in the urban environment. London: Pion.

Kuller, R. (1972). A semantic model for describing perceived environment (Document No.12). Stockholm: National Swedish Institute for Building Research.

Kunawong, C. (1986). The study of responses to architectural exteriors by architectural and non-architectural students. Dissertation Abstracts International, **47**, 687.

Lee, T.R. (1954). A study of urban neighbourhood unpublished PhD thesis, University of Cambridge.

Lowenthal, D. (1975). Past time, present place: landscape and memory. *Geographical Review*. **65**, 1-36.

Lowenthal,D. and Reil,M. (1972). The nature of perceived and imagined environments. *Environment and Behaviour* **4**, 189-207.

Lowethal, D. (1972). Environmental Assessment: Comparitive Analysis of Four Cities. Publications in Environmental Perception No 5. New York: American Geographic Society.

Lynch, K. (1972). What time is this place? Cambridge, Massachusetts: MIT Press.

Lynch, K. (1960). The Image of the City. Cambridge, Massachusetts: MIT Press.

Martindale, C., Moore, K., and Borkum, J. (1990). Aesthetic preference: Anomalous findings for Berlyne's psychobiological theory. *American Journal of Psychology* **103**, 1, 53-80.

Moles, A. (1964). Information theory and aesthetic perception. Bloomington, Indiana University Press.

Nasar, J.L. (1988). Environmental Aesthetics; Theory, Research, and Applications. New York: Cambridge University Press.

Newman, O. (1972). Defensible Space. New York: MacMillan, and London: Architectural Press.

Oostendorp,A. and Berlyne,D.E. (1978). Dimensions in the perception of architecture. *Scandinavian Journal of Psychology* **19**, 73-89.

Osgood, C.E., Suci, G.J., & Tanenbaum, P.H. (1957). The measurement of meaning. Urbana: University of Illinois Press.

Payne, E.F.J. (1966). The world as will and representation. New York: Dover.

Piper, J. (1947 reprinted 1984). Pleasing decay. *Architects Journal* **179**, 87-89.

Porteous, D. (1982). Approaches to environmental aesthetics. *Journal of Environmental Psychology* **2**, 53-60.

Rapoport, A., and Hawkes,R. (1970). The perception of urban complexity. *Journal of the American Institute of Planners* **36**, 106-111.

Rapoport, A., and Kantor, R.e. (1967). Complexity and ambiguity in environmental design. *Journal of the American Institute of Planners* **33**, 210-222.

Rosch, E., and Mervis, C.D., (1975). Family resemblances: Studies in the internal structure of categories. *Cognitve Psychology* **7**, 573-605.

Rosch, E. (1975). Cognitive reference points. *Cognitve Psychology* **7**, 532-547.

Rosch, E., Mervis, C.D., Gray, W.D., Johnson, P.M., and Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitve Psychology* **8**, 382-439.

Russell, J.A., and Ward, L.M. (1981). The psychological representation of molar physical environments. *Journal of Experimental Psychology: General* **110**, 121-152.

Sanoff, H. (1969). Visual attributes of the physical environment. Response to Environment. NY State Univ. School Design Student Pub. 18, 36-60.

Schellekens, H.M. (1978). Appearance of streets and experience with them: Report on investigations in the field of environmental psychology. Netherlands Tijdschrift voor de Psychologie en haar Grensgebieden. 33, 403-421.

Schwarz and Werbik (1971). The affect of syntactic information conveyed by patterns of houses along a street upon the mood of observers. An experimental investigation. *Zeitschrift fur experimentelle und anglewandte psychologie* **18**, 3, 499-511.

Scruton, R. (1979). The Aesthetics of Architecture. Methueun & Co. London

Seaton, R. and Collins, J. (1972) Validity and reliability of ratings of simulated environments. In Environmental Design: Research and Practice. Proceedings of EDRA 3 conference, Mitchell, W.J. (Ed), 6-10-1 to 6-10-12. Los Angeles: UCLA

Shafer, E.L. and Richards, T. A. (1976) A comparison of viewer reactions to outdoor scenes and photographs of those scenes. In Canter, D. and Lee, T. (Eds) Psychology and the built environment. Architectural Press.

Shannon, C.E. and Weaver, W. (1949). The Mathematical Theory of Communication. Urbana, Illinois: University of Illinois Press.

Shapira, Z., (1976). a facet analysis of leadership styles. *Journal of Applied Psychology* **61**,136-139.

Sommer, R. (1965). Further studies in small group ecology. *Sociometry*, **28**,4,337-348.

Steffan (1988). In Verhoef, L.G.W. (Ed.) (1988). Rilem Report, Soiling and cleaning of building facades. Chapman Hall.

Stone Federation (Undated). Information from the stone federation. Stone Federation.

Taylor, R.N., and Taylor, M.E. (1973). Differential perceptions of environmental aesthetics. *Perceptual and Motor Skill* **37**, 587-591.

Tuan, Y-F (1977). Space and Place; the perspectives of experience. Minneapolis: University of Minnesota Press.

Ulrich, R.S. (1984). View through a window influences recovery from surgery. *Science* **224**, 420-421.

Venturi, R. (1966). Complexity and contradiction in architecture. New York: Museum of Modern Art.

Venturi, R., Brown, D.S., and Izenoir, S. (1972). Learning from Los Vegas. Cambridge, Mass.: MIT Press.

Verderber, S., and Moore, G.T. (1977). Building Imagery: A comparative study of environmental cognition. *Man-Environment Systems* 7,6, 332-341.

Verhoef, L.G.W. (Ed.) (1988). Rilem Report, Soiling and cleaning of building facades. Chapman Hall.

Vielhauser, J. (1965). The development of a semantic scale for the physical environment. *Dissertation Abstracts*, No. 66-759.

Whitfield, T.W.A., and Slatter, P.E. (1979).The effcets of categorization and prototypicality on aesthetic choice in a furniture selection task.*British Journal of Psychology* **70**, 65-75.

Wilson, M.A., and Canter, D. (1990). The development of central concepts during professional education. An example of a multivariate model of the concept of architectural style. Applied psychology: An international Review, (Oct.) **39,4**, 431-455.

Wohlwill, J.F. (1968). Amount of stimulus exploration and preference as differential functions of stimulus complexity. Perception and Psychophisics, **4**, 307-312.

Wohlwill, J.F. (1974). The place of aesthetics in the study of the environment. Paper presented at the International Congress of Applied Psychology, Montreal.

Wohlwill, J.F. (1976). Environmental aesthetics: The environment as a source of affect. In I. Altman and J.F. Wohlwill (Eds.), Human behaviour and environment (Vol. 1, pp. 37-86). New York: Plenum Press.

Wundt, W. (1874). Grundzuge der physiologischen Psychologie (Fundamentals of physiological psychology). Leipzig: Engelmann

Zajonc, R.B. and Rajecki, D.W. (1969). Exposure and affect: A field experiment. *Psychonomic Science*, **17**, 216-217.

Zajonc, R.B. (1968). Attitudinal effects of mere exposure. *Journal of Personality ans Social Psychology, Monograph Supplement*. **9**, 1-27.

Zajonc, R.B. (1980) Feeling and Thinking, preferences need no inferences. *American Psychologist*. **35**, 2, 151-175.

Appendix 1

Wardlaw Street Residents Survey

1. Address _____

2. Male [ ] Female [ ]

3. Age 20-30 [ ] 31-40 [ ] 41-60 [ ] Over 60 [ ]

4. Household members_____

5. What features of the improvements in the street have made the most welcome change?

6. Do you feel that the improvements have increased the value of your property?

   Yes [ ] No [ ] Unsure [ ]

7. If yes what improvement has contributed most to the increase in value?

8. Please rate how much you liked the changes to the following;-

	Marginal Improvement				Considerable Improvement
A. Entryphone system	1	2	3	4	5
B. Preperation flooring	1	2	3	4	5
C. Stair painting	1	2	3	4	5
D. Stonecleaning	1	2	3	4	5
E. Communal TV aerial	1	2	3	4	5

9. Do you think that the general character of the street has changed as a result of stonecleaning?

   Yes [ ] No [ ] Uncertain [ ]

10. If Yes in what way has it changed?

11. Did the tenement look the way you expected it would after it was stonecleaned?

    Better [ ] Worse [ ] As Expected [ ]

12. Which side of the tenement would you have prefered to have been cleaned?

    Front [ ] Rear [ ] Neither [ ]

13. The stonecleaning was funded by an environmental improvement grant, which was at the 100% level. If the work was costed in the same way as the other work in the tenement, would you have been prepared to pay your share of this cost as well ie. 10% or 25%?

    Yes [ ] No [ ] 10% [ ] 25% [ ]

14. Would you have been prepared to meet the whole share ie. 100%?

    Yes [ ] No [ ]

15. Are there any asspects of the stonecleaning or its process that you were unhappy about?

16. Any other comments?

Thank you.

Appendix 2

ON SITE EVALUATIONS
EDINBURGH

BUILDING EVALUATED

Please can you look at the building opposite. I would like you to rate the building on a number of seven point scales:-

	1	2	3	4	5	6	7	
WELL LOOKED AFTER	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	SHABBY
GLOOMY	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	CHEERFUL
ATTRACTIVE	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	UNATTRACTIVE
HAS CHARACTER	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	HAS NO CHARACTER
CLEAN	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	DIRTY
TIDY	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	UNTIDY
PLEASING COLOUR	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	DISPLEASING COLOUR
UPLIFTING	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	DEPRESSING

1.CAN YOU NAME ANY BUILDINGS OR LOCATIONS IN THE CITY WHICH YOU HAVE NOTICED HAVE BEEN EXTERNALLY CLEANED?

	SHOULD HAVE BEEN CLEANED	SHOULD NOT HAVE BEEN CLEANED	REASON
I.			
II.			
III.			
IV.			
V.			
VI.			
VII.			
VIII.			
IX.			
X.			

2. ARE THERE ANY BUILDINGS/PLACES IN EDINBURGH WHICH SHOULD BE CLEANED?

REASON

I.

II.

III.

IV.

V.

3. ARE THERE ANY BUILDINGS/PLACES IN EDINBURGH WHICH SHOULDN'T BE CLEANED?

REASON

I.

II.

III.

IV.

V.

4. CAN YOU INDICATE WHAT REASONS OR BENEFITS THERE MIGHT BE IN FAVOUR OF CLEANING THE EXTERIOR OF BUILDINGS?

5. DO YOU FEEL THERE ARE ANY DRAWBACKS TO CLEANING THE FACADES OF BUILDINGS OR REASONS WHY BUILDINGS SHOULD NOT BE CLEANED

6. WHAT WOULD YOUR PRIORITY FOR THE CLEANING OF THE FOLLOWING TYPES OF BUILDINGS IN EDINBURGH

A. HISTORIC OR LISTED BUILDINGS AND MONUMENTS [ ]

B. SIGNIFICANT PUBLIC BUILDINGS (e.g.CHURCHES,MUSEUMS ETC.)[ ]

C. VISIBLE FACADES OF INDUSTRIAL PREMISES [ ]

D. TENEMENTS AND ROWS OF HOUSES IN STREETS [ ]

E. COMMERCIAL PREMISES IN STREETS [ ]

7. GENERALLY SPEAKING WOULD YOU SAY THAT THE CLEANING OF BUILDING FACADES IN EDINBURGH HAS BEEN:-

A. ENTIRELY FOR THE BETTER [ ]

B. LARGELY FOR THE BETTER [ ]

C. NEITHER FOR THE BETTER OR WORSE [ ]

D. LARGELY FOR THE WORSE [ ]

E. ENTIRELY FOR THE WORSE [ ]

REASONS?

8. SOMETIMES IN ROWS OF PROPERTIES ONLY PARTS OF THE TERRACE WILL BE CLEANED (AS IN THIS STREET).
WHAT EFFECT DOES THIS PARTIAL CLEANING HAVE ON THE LOOK OF THE STREET?

9. ARE YOU IN FAVOUR OF OWNERS BEING PERMITTED TO CLEAN INDIVIDUAL FACADES IN TERRACES?

YES [ ]

NO [ ]

DONT KNOW [ ]

10. IS CLEANING SOME OF THE FACADES BETTER THAN LEAVING THEM ALL IN THEIR ORIGINAL STATE?

YES [ ]

NO [ ]

DONT KNOW [ ]

REASONS?

11. DO YOU FEEL THAT THE CHARACTER OF EDINBURGH HAS CHANGED AS A RESULT OF THE EXTERIOR CLEANING OF BUILDINGS?

YES [ ]

NO [ ]

UNCERTAIN [ ]

12. (IF YES)

DO YOU FEEL THAT THE CHARACTER HAS CHANGED FOR THE BETTER OR WORSE?

CHANGED FOR BETTER [ ]

CHANGED FOR WORSE [ ]

13. IN WHAT WAY HAS THE CHARACTER CHANGED?

14. SEX

15. LENGTH OF RESIDENCE

16. STREET/PLACE OF RESIDENCE

17. AGE

COMMENTS.

Appendix 3

THE ROYAL INCORPORATION
OF ARCHITECTS IN SCOTLAND
15, RUTLAND SQUARE, EDINBURGH EH1 2BE
TELEPHONE 031-229 7545/7205
FAX 031-228 2188

February 1991

Scott Sutherland School of Architecture
Garthdee Road
Aberdeen

Dear Architect

As an architect you are doubtless aware of the extensive stonecleaning activity that has been undertaken in recent years within the city. In an attempt to investigate more fully this practice a multidisciplinary research group with funding from Historic Buildings and Monuments, and the Scottish Development Agency has been set up at Robert Gordon's Institute of Technology in Aberdeen. As part of this work the team are interested in the views of architects on the aesthetic effects which stonecleaning has had on the city.

In order to ascertain your views on the subject I am enclosing a questionnaire which we would be most grateful if you could complete and return in the post paid envelope provided, preferably within the next two weeks.

I appreciate that this is an imposition on you, and that it would be easy to put the questionnaire aside and forget about it, but the subject matter is relevant within the city and the results of the research will have important consequences for future stonecleaning activity throughout Scotland. I hope therefore you will help the research by completing the questionnaire. We are anxious to obtain the views of all architects, including those who have not been directly involved in stonecleaning work.

All responses will be regarded as confidential.
Thank you in anticipation.

Yours faithfully

Stonecleaning Research Group

AESTHETIC ASPECTS OF STONECLEANING
SURVEY OF ARCHITECTS

Name of Architectural Practice:-

Please comment in the spaces provided; if these prove insufficient for your needs, please continue on the reverse side, or on a separate sheet.

1. (a) In general, what is the effect of stonecleaning on the townscape, street context, etc, of Edinburgh?

(b) Which particular sites in Edinburgh do you feel have been improved in terms of townscape, street context, etc, as a result of stonecleaning, and why?

(c) Which particular sites in Edinburgh do you feel have been negatively affected in terms of townscape, street context,etc, as a result of stonecleaning, and why?

(d) Are there any buildings in Edinburgh where you feel soiling has enhanced the aesthetic appeal, and which stonecleaning would be detrimental in terms of aesthetics? To which buildings, if any, would this apply?

2.(a) How, if at all, is the visual 'character' of a building changed by cleaning?

(b) Can you give examples of buildings in Edinburgh which have been significantly changed in character by cleaning, and say how your aesthetic appreciation of them was altered as a result of cleaning?

(i)

(ii)

(iii)

(iv)

(v)

3. (a) In your view, are there any ethical issues involved in attempting to make an old building look the way it did when first constructed, by the use of stonecleaning? If so what are they?

(b) Are there any particular examples in Edinburgh where this process has been aesthetically successful?

(c) Are there any particular examples in Edinburgh where this process has not been successful?

(d) Are you generally in favour of attempts made to return old buildings to their original appearance by stonecleaning?

Yes [ ]

No [ ]

Uncertain [ ]

4. Visual problems resulting from cleaning:

In buildings where the following problems have come to light, generally how serious have you found the aesthetic effect on buildings to be?
Please tick the appropriate box.

4(a) Exposure of stone defects

Extent of the aesthetic problem:-

Serious [ ]

Moderate [ ]

Minor [ ]

None [ ]

Can you give any examples of sites where the exposure of stone defects has been an aesthetic problem?

Any other comments?

4(b) Staining

Extent of the aesthetic problem:-

Serious [ ]

Moderate [ ]

Minor [ ]

None [ ]

Can you give examples of sites where staining has been aesthetically problematic?

Any other comments?

4(c) Bleaching

Extent of the aesthetic problem:-

Serious [ ]

Moderate [ ]

Minor [ ]

None [ ]

Can you give examples of sites where bleaching has been aesthetically problematic?

Any other Comments?

4(d) Algal re-growth

Extent of the aesthetic problem:-

Serious [ ]

Moderate [ ]

Minor [ ]

None [ ]

Can you give examples of any sites where algal re-growth has been aesthetically problematic?

Any other comments?

4(e) Others? (Please specify)

5.(a) Does the insertion of new stone, as indents etc, generally necessitate cleaning the whole of a facade?

(b) In what particular circumstances are new stones in an old building visually acceptable without the whole frontage being cleaned?

(c) In what particular circumstances are new stone in an old building unacceptable without the whole frontage being cleaned?

(d) Are there examples of buildings in Edinburgh where indents have been aesthetically problematic? What have these problems been?

6. Sometimes in rows of properties only parts of the terrace will be cleaned. Are you in favour of owners being permitted to clean individual facades in terraces?

Yes [ ] No [ ] Uncertain [ ]

7. Is cleaning some of the facades better than leaving them all in their original condition?

Yes [ ] No [ ] Uncertain [ ]

What are the reasons for your choice?

8. Generally speaking would you say that the cleaning of building facades in Edinburgh has been:-

A. Entirely for the better [ ]

B. Largely for the better [ ]

C. Neither for the better or worse [ ]

D. Largely for the worse [ ]

E. Entirely for the worse [ ]

9. Generally speaking are you in favour of stonecleaning? (Qualify your answer if you wish)

Yes [ ]

No [ ]

Undecided [ ]

10. Any other comments?

11. Would you be prepared to talk to a researcher, perhaps on the telephone, about the above points in greater detail at some point in the future?

Yes [ ]

No [ ]

Name and position of person completing the questionnaire:-

Name Position

Thank you for your assistance